THE OLD TIMER'S BULLETIN

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Published for the Collector, Historian and Old Time Wireless Operator

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AWA NETS (EDST)

Phone:
Sun. 7247 kHz SSB, noon (NCS: N4FS)
3867 kHz AM, 7 PM (NCS: W2AN/W2ICE)
Tues. 14274 kHz SSB, 2:30 PM (NCS: varies)
3837 kHz SSB, 8 PM (NCS: N4FS)
Mon.-Wed.-Fri. 3867 kHz, 9:30 AM (NCS: W2AN/W2ICE)
CW:
7050 kHz (NCS: varies)
Daily at 4 PM; first Wed. of each month at 8 PM
2-m FM Repeater (Rochester area): receive: 146.820; transmit: 146.220; Mon. & Wed., 7:30 PM (NCS: KE2ST or W2ICE)

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FROM THE EDITOR

This OTB, unlike other recent issues, has no specific theme; just a lot of good articles from writers who care about antique radio. Suggestions for future themes are welcome.

SEEN IN THE FLEA MARKET

A small home-built receiver from the '20s: a typical two-tube regenerative set. The wooden case, made from planks, is painted Army olive drab. It's scruffy, less tubes and switches, but somewhat interesting. At 9 AM it's on sale on Table A, priced at $3. At 10 AM it's been bought, and is now on sale on Table B, labeled "WW I" and priced at $85. *Caveat emptor*!

AWA REVIEW, VOL. 7

By the time you read this, AWA Review Vol. 6 should be in printing. This is a "call for papers" for a 1992 edition of the Review. The AWA Board has concurred with producing the next version, so if you are interested in contributing, please contact the editor. The "Hints for AWA Authors" sheet is still available for an SASE.

QSO PARTY

One additional participant in last Fall's QSO Party, not recorded previously, is Wells Burton, N4EE, with four contacts.

R1155 PACKAGE AVAILABLE

The request for tech information on the British R1155 receiver in the May OTB brought results. Diagrams and related material were contributed or offered by three Canadians: Jim Hinchley, VE3CLX; Doug Brighton; and David Noon, VE3IAE; and by Geoff Dixon-Nuttall in the UK. As a result, a diagram package is available from your editor for a large (9" x 11") SASE with 52¢ postage. The diagram is large enough (25" long) to be readable, and has parts values marked in. Many thanks to the contributors. [LAS]

THE COVER

Frost Musette horn speaker. See Floyd Paul's Loudspeaker column, page 14, for more details.

AWA NEWS

CALENDAR

July 27 - Yankee Tune-Up - E. Greenwich, RI
August 3 - CHRS Meet, Los Altos Hills, CA
August 8-10 - ARCI Radiofest, Elgin, IL
August 17 - SCARS regular meet
August 17 - NFWA/AWA Summer Meet, Millersport, NY
Sept. 25-28 - AWA Conference, Rochester
November 3 - Annual AWA business meeting
November 8-10 - VRPS/AWA, Dallas
November 16 - SCARS regular meet

YANKEE TUNE-UP

Saturday, July 27

The New England Museum of Wireless and Steam invites radio collectors to test-run their vintage sets (neutrodynes, regeneratives, TRFs, superhets, etc.) on a special test bench equipped with A-, B-, and C-power, active antenna and ground. This is a repeat of a similar event on May 19, and is comparable to recurring "Yankee Steam-Up" events starring their collection of restored steam engines. The Museum is at 697 Tillinghast Rd., E. Greenwich, RI 02818.

CHRS MEET

Saturday, August 3

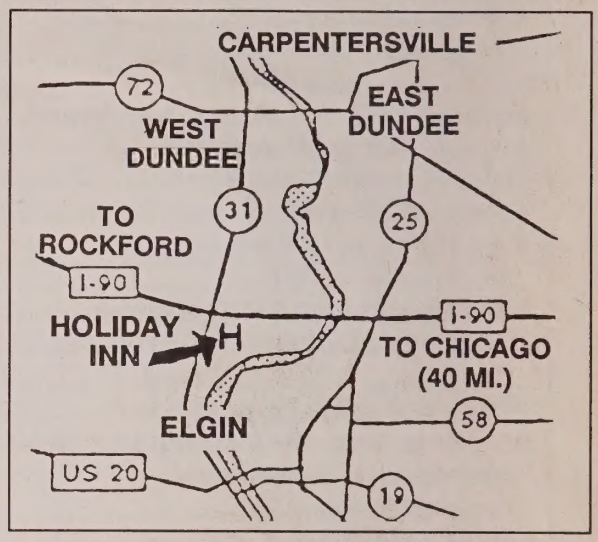
The California Historical Radio Society will hold its next quarterly meeting at Foothill College. The usual starting time is 6 AM. Following the CHRS flea market, the Perham Foundation will sponsor an auction at the Foothill Electronics Museum at 11 AM, with the purpose of selling artifacts that are not museum quality or duplicate items so we will not have to store them when we move out September 15th. [Mike Adams]

ILLINOIS MEET - ARCI RADIOFEST

Thursday-Saturday, August 8-10

Organized by the Antique Radio Club of Illinois at the Holiday Inn Holidome and convention center, 345 River Rd., Elgin, IL 60123. Site is 40 miles west of Chicago, off I-90. Features three days of flea marketing, general and donation auctions, special exhibit, hospitality suite, afternoon presentations, a 12-category old-equipment contest and an awards banquet on Friday evening. One session will cover Ed Dervishan's experiences as Lee de Forest's last personal assistant.

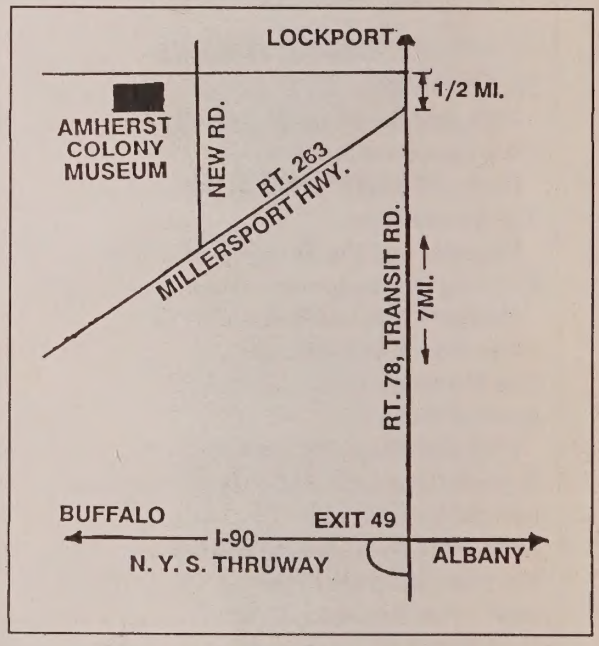
For information (don't delay): Dave Johnson, 2336 S. Kenilworth, Berwyn, IL 60402, (708) 484-2743. For the hotel: (708) 695-5000 or 800-HOLIDAY. [Jeff Aulik/Bill Ross]



NFWA/AWA SUMMER MEET

Saturday, August 17

Old Amherst Colony Museum, 9:30-3:30. No advance registration needed; $2 at the door. Activities will include a flea market; an old-equipment contest with categories of crystal receivers, 1920s battery receivers, AC-operated sets, and novelty radios of any type; and a auction (up to five items per participant) The museum will have a display of early radios. For information, call Jim or Felicia Kreuzer on (716) 681-3186.



AWA ANNUAL CONFERENCE - ROCHESTER

Wednesday-Saturday, Sept. 25-28

This year's event will again be at the Thruway Marriott near Rochester (in rural Henrietta, NY). The schedule is like last year's, but a week later.

Auctions: Communications equipment, Thursday AM. Tubes, Friday AM; then books, literature, and the General Auction.

Technical Programs: See pp. 27-28.

Museum Hours: See p. 27.

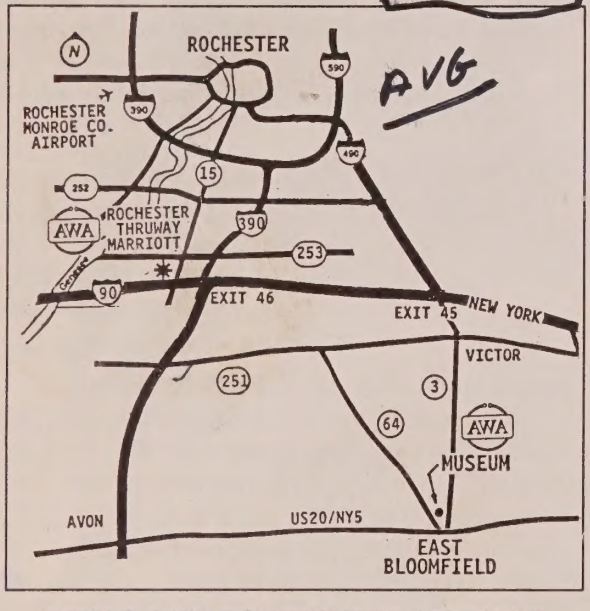
Flea Market: It was three acres full last year . . .

Sightseeing Excursion: Eastman House (museum), lunch, and Strong Museum.

The Thruway Marriott is a full-sized, full-service hotel. It is about 15 minutes from downtown or the airport. Its generous-sized meeting rooms take an AWA-sized crowd nicely. The dining room is quite good. The flea-market area is paved and lighted.

The hotel is reached from Exit 46 of the New York State Thruway (I-90) - take I-390 north to NY 253 west, to NY 15 south. The site is 21 easy miles from the Museum at East Bloomfield. For visitors arriving by air, there is shuttle service, 7 AM - 11 PM. (There is another Marriott in Rochester; be sure to ask for the correct shuttle.)

The hotel offers special nightly rates ($70 single, $80 double, $90 triple, $100 quad) up to August 24. For info or reservations, call (716) 359-1800.



TEXAS AND SOUTHWEST MEETING

Friday-Sunday, November 8-10

VRPS/AWA Convention '91 will be held in Dallas. This year is the 17th anniversary of the Vintage Radio & Phonograph Society. The convention will again include both a Friday and a Saturday auction, with more Friday activities.

Two technical programs will be presented Friday afternoon, followed by an auction Friday night. Saturday's program includes (1) the Old-Equipment Contest, (2) the second auction and (3) the Awards Banquet with a very interesting program. The customary flea market will occur on Sunday morning and will again be inside and weatherproof.

This year's convention will be held at the Holiday Inn D-FW Airport South near the airport. For members coming by plane, the hotel provides free transportation from and to the airport.

To encourage advance registration, VRPS/-AWA Convention '91 will be giving away two very fine prizes: a cathedral radio and an early phonograph. AWA and VRPS members who register is advance, and only advance registrants, will receive chances for the drawing for these prizes.

For a registration card, program, map, etc., contact: Don Nordenholt, registration chairman, 1509 Cliffbrook Drive, Plano, TX 75075 [C. F. Crandell]

SILENT KEYS

(AWA members, amateur licensees or not)

David M. Eller, N1AYU, a broadcast engineer for 30 years with WVIT-TV. Prior to that he was associated with WTOR-AM (Torrington) and WDRC-AM (Hartford), both in CT. He lived in Collinsville, CT.

Lloyd E. Furrow, Dayton, OH

Horace Gross, W1AB

Bill Lightfoot, W1PEG

Fred Shunaman, N2JLO, 90, former writer for, and managing editor of, such Gernsback publications as "Radio-Craft" and "Radio-Electronics." Associate of Hugo Gernsback and Lee de Forest. Honorary member of AWA; secretary of the Radio Club of America.

Fred R. Williams, West Hartford, CT

AWA REVIEW AVAILABLE

Volumes 1, 3, 4, and 5 are presently in stock. For a listing of the contents of these, see the May OTB. To obtain copies, make checks out to Antique Wireless Association and mail to: Ludwell Sibley, 44 E. Main St, Flemington, NJ 08822-1224. Vols. 1, 4, or 5, $10.50; Vol. 3, $9.50 postpaid in the U. S. and Canada. Please add $4.00 per copy for overseas air mail. We expect to have Vol. 6 (1991) available - **and a new printing of Vol. 2** - available at the Conference.

BACK ISSUES

The following issues of the Old Timer's Bulletin are in stock and orderable as above.

Volume and Number

14-1 14-4 15-3 15-4 17-1 18-2 18-3 19-4 21-1 21-2

Also, in Vols. 20 and 22-31, all four numbers of each volume are available. Prices are $2.50 each postpaid. Additionally, from Vol. 1, all four numbers xerocopied as a group (34 pages total), $2.50.

Several recent issues have particular themes:

Broadcast Receivers: 30-4 (Feb. 1989)

Communications Equipment: 32-1 (May '91).

"International" Topics: 31-4 (Feb. 1991)
Military Equipment: 30-3 (Nov. 1989)
Restoration Techniques: 31-2 (Aug. 1990)
Tubes: 31-3 (Oct. 1990)
Wireless Technology: 31-1 (May 1990)

Also available are the following monographs at $1.50 each: "A Technological Survey of Broadcasting's 'Pre-History,' 1876-1920" (Elliott Sivowitch; 20 pp.); "The Federal Telegraph Co., 1909-1920" (Thorn Mayes; 13 pp.); and "Priority in the Invention of Radio: Tesla vs. Marconi" (Leland Anderson; 9 pp.). Index to OTB Vols. 1-31 and Review Vols. 1-5, free with purchase.

BULLETIN DEADLINES

As with any publication, production and printing require a certain amount of lead time. In submitting material for publication, please adhere to the following dates for the October issue: want ads, August 26; articles and meeting notices, August 31.

NEW SUNDAY 75-M SSB SCHEDULE

Henceforth the Sunday net at 5 PM on 3837 kHz will be moved to 3867 at 7 PM EDST. The old time and frequency will return at the end of Daylight Saving Time. Members are encouraged to use early equipment.

BOOKS AVAILABLE

The Museum de-accession committee has selected a quantity of early radio books and magazines to be sold at the Museum. In addition, the AWA Review is available at a saving, since packing and mailing charges are eliminated.

MATERIAL FOR OT TRANSMITTER

Would you like to build an old-time transmitter? The Annex has a large collection of surplus components and tubes for the amateur builder. Check with Bruce Kelley or John Ward. [BK]

NOMINATIONS FOR AWA AWARDS

It is time to nominate candidates for five prizes to be given at the annual Conference.

The **AWA Houck Award** for documentation goes to an AWA member who has written several original articles on radio development or history in the OTB, Review, or other publication. (This can include a book on a related subject.) The nominee for preservation should be a member who, through personal accomplishment, has acquired and preserved by documenting an outstanding collection of radio artifacts. This definition excludes individuals who regularly buy and sell items. Send your selection(s) to the awards administrator, giving your reasons why the nominee(s) should receive the Award. The address: Robert Merriam, 697 Tillinghast Rd., East Greenwich, RI 02818.

The **BK-OTB Award** is given to the member who publishes in the Old Timer's Bulletin an article judged to be the most outstanding, original historical presentation of the award year. For this year, articles in the October 1990 and February, May, and August 1991 issues will be considered. All AWA members are eligible for this award except members of the Award Committee and the OTB editor. Nominations should be sent to award-committee chairman Bill Denk, W3IGU, 81 Steeplechase Rd., Devon, PA 19333. Simply identify the article and the nominee, with reasons for your selection.

The **Taylor Award**, in memory of John Taylor, RCA TV developer, is for "preserving television history." Submissions are invited here, too. They may be sent to Ross Smith, 1133 Strong Ave., Elkhart, IN 46514.

The **Tyne Tube Award** is presented, in remembrance of Gerald F. J. Tyne, for contributions to preserving or documenting the history of tube technology. Nominations of AWA members are needed for the 1991 award. They may be sent, with supporting reasons, to the administrator, Lauren Peckham, Ormiston Hill Rd., Breesport, NY 14816-9709.

Receipt of all nominations by September 1 is requested.

TUBE AUCTION RESULTS

The mail auction of excess tubes held by the AWA Museum (May OTB, p. 37) yielded the following winning bids. As usual, proceeds of the sale go toward operating expenses of the Museum. [Results from Dexter Deeley.]

Arcturus Blue (6): Crosley 55 124, and PZ; Arcturus 124 and 127; Sonora RA-1 ..... $65
Audiotron; label; good leads, open fil. 65
Crosley Deflectron (OTB, Oct 1990, p. 48) 125
Daven MU-6; w/label 23
De Forest Audion; spherical, double plates, short orig. leads, both fils. good 526
De Forest DV-2; w/label, good 20
Electron Relay; Shaw base, good 131
Marconi - de Forest VT (open fil.) 54
Marconi V24 (2); new in box, w/instruction sheets 161
Myers Audion; good, w/socket 45
UV-201As (4) and UV-200 (1), brass-based and tipped, good 100
UV-216 and UV-202; brass-based and tipped 75
UX-199s (3) and UV-199 (1); brass-based and tipped; good 75
UX-874 (2) and UV-876 (1) 9
W. E. 102F and 205D; good 100
W. E. 300B; new 150
W. E. VT-2 (gold tips) and VT-1 (non-gold) 77
Westinghouse TB-1 (WW I diode); good 92

(Continued on p. 38)

RESTORING A 67-1/2 VOLT BATTERY

Larry Babcock
8095 Centre Lane, E. Amherst, NY 14051

Many portable radios made in the WW II era, such as the RCA BP-10, require a 67-½ volt "B" battery. Because these batteries are hard to find these days, I had been taping a bunch of seven common 9-volt batteries together and cramming them into the battery space in the set. This got the radio working, and was fine with the set closed up, but looked improper when the back was removed. It would be particularly inappropriate in any receiver being entered in an antique-radio contest!

I realized that other collectors must have this problem. Apparently many of you are now collecting these newer tube portables because I hardly ever see one for sale in "nice" condition but see very high prices on junkers at radio meets.

I wondered how difficult it would be to pull the old cells out of the battery case and insert new 9-volt units. Could the old cells be removed without ruining the cardboard case? Would standard 9-volt units fit in the same volume?

My first attempt to open the battery case was from the end away from the terminals. I found that this end of the cardboard cover was glued together tightly and very hard to open without damaging the cover. Next I tried to open the cover at the top. This was much easier. Using a razor blade or Stanley knife, the top opened right up, exposing the terminals and cells beneath. The cells always seem to swell a little with age, but by slowly pulling, the inner cells gradually separated from the box cover.

This was so easy I tried to open another 67-½ volt battery. It was much easier. I had the cells out of the cardboard box in about five minutes with no damage to the case.

The next question was, would new 9-volt batteries fit the case? At first I thought not, but after trying many combinations I found one that works. Note in the picture that six of the new batteries are lying on their small sides and then stacked three high. This is the only combination that I found that would allow seven new batteries to fit. The rebuilt battery produces 7 X 9 = 63 volts. This is about right, considering that the new battery is alkaline and has less internal voltage drop than the old cells. The seventh battery fits in along the side of the others as shown in the photo. With this arrangement there was plenty of room for all seven.

Incidentally, a word of caution. The new battery cases looked metallic. I wondered if they could short out other batteries if the terminals of one made contact with the case of another. The answer is yes, they can. There is a non-conductive finish on the cases, but when this is scratched off, there is metal underneath. *Be careful not to short out the new batteries by letting the terminals of one contact the case of another!*

As the photo shows, I didn't just solder wires to the battery terminals. Rather, I got some inexpensive snap-on battery connectors from Radio Shack and made up a harness of seven connectors in series with the terminals of the old battery. This way, I could just snap the connectors onto the new batteries. When they finally wear out, they can be disconnected and a new set installed. With the new batteries and harness in the old case, I used a small piece of double-sided Scotch tape to seal the case top together. At replacement time, this seal can be opened easily and the entire contents removed for replacement in about 10 minutes.

After I had finished, it was difficult to tell which battery I had rebuilt. I always use alkalines for replacement because they last about three times as long as zinc-carbon types, both playing the radio and on the shelf.

Of course, after rebuilding the old battery I

learned that one can buy new 67-½ volt batteries! Antique Electronic Supply (6221 S. Maple Ave., Tempe, AZ 85823, 602-820-5411) sells their SZ-467 for $14.60 plus shipping and handling. They have other sizes for comparable prices. Still, there are advantages to rebuilding your own. For one thing, you can use any old-style case that you are able to obtain. The result may look more authentic than a new battery. Also, as said before, with alkaline you can greatly increase the capacity and life of the battery. Finally, it may also be cheaper. I was able to get three-pack batteries at K-Mart for $4.69, with a $1.50 rebate on each pack. This got the price down to $1.15 per battery (including stamps to mail in the rebate!). So I paid just over $8.00 for a more authentic-looking, longer-lived, and renewable battery. Battery clips cost about $1.68 more.

I have tried this only on the 467-type 67-½ volt battery. I have also looked at some of the old 45- and 90-volt types and it appears that they should open up the same way. So go ahead and try it. I used this technique to restore the batteries for a Motorola 5A1 that I carried through Europe during WW II and now have it looking and working just as it did when it was new.

A SIMPLE BATTERY ELIMINATOR

Robert E. Hager, K3HOX
136 W. York St., PO Box 301, Biglerville, PA 17307-0301

Following the acquisition of a quantity of small battery sets, one realizes that batteries are bulky, relatively unobtainable, and expensive. In the late Twenties and early Thirties there was a plethora of battery eliminators on the market. Presented here is a circuit similar to the old ones, with a "modern" approach, for you to build.

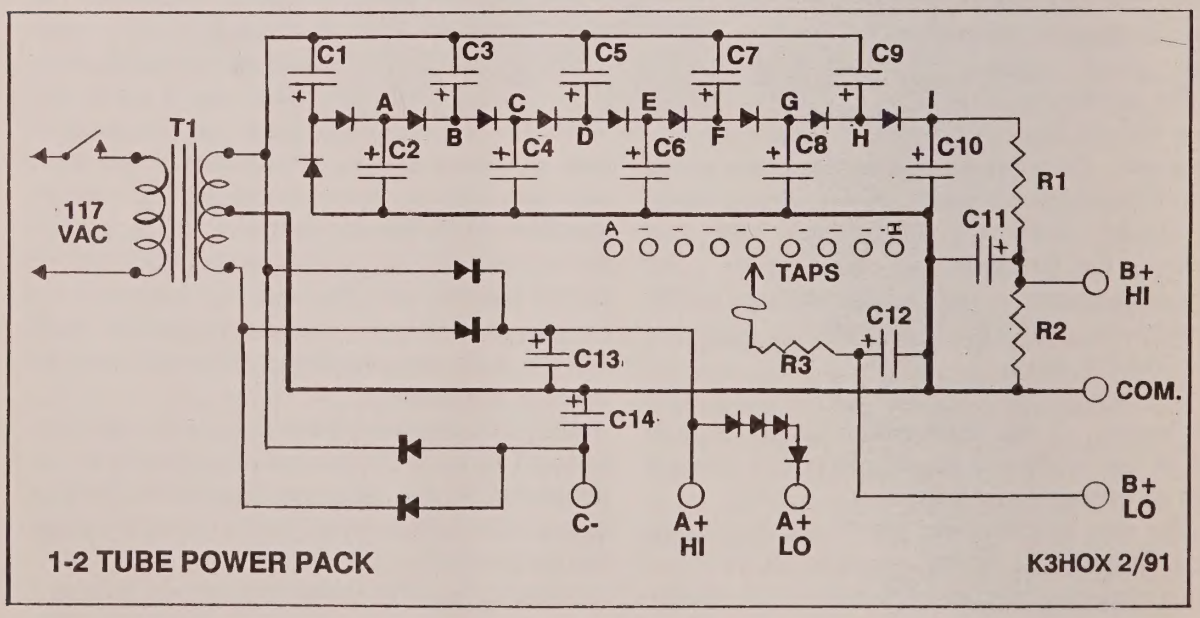
The objectives are as follows:

- Provide a voltage range suitable for a "gassy" detector in a regenerative circuit, and a following "one-step" amplifier.
- Limit the energy output of the "B" supply to reduce the possibility of "blowing" an old rare, expensive tube. (Who has never connected "B+" to the filament?)
- Use readily available parts.
- Avoid semiconductor regulators that can short and "blow things up."
- Fit inside most small battery sets.

For all you oldtimers who remember the various voltage multipliers that were used in the old sets, and in the newer TVs, here is a new application circuit, a "voltage tener" to provide 45 V from one-half of a 6.3-V filament transformer, with enough taps in between to satisfy most earphone phreaks.

Note that half of 6.3 X 1.414 equals about 4.5 volts, which times ten yields 45 volts of "B+." This circuit is known as a "parallel" multiplier, and requires that the capacitors have higher voltage ratings as multiplication takes place. (The more common "series" multiplier uses capacitors of the same low voltage rating, but has much more ripple in the output.)

In addition, we can obtain ±4.5 volts at no load for the filaments. If the -4.5 V is not used for "A" it may be used for "C" bias. Also, by including a string of four series diodes, lower voltage is available for tubes like the WD-11 or 864. The higher voltage is for 99s, etc. (The number of diodes



may have to be adjusted, depending on the regulation of the transformer and the power line voltage.) Use of the ± filament connection instead of the "common" connection provides a ± option for those sets where the "A-" and "B-" are not common. Use your ingenuity, read the set schematic, but don't short the 4.5 volts (it's hard on diodes!).

Back at the "B+," note that a 330-ohm resistor and small filter capacitor have been included. This provides additional ripple reduction and limits short-circuit surge currents. The voltage drop at a few mils of load current is negligible. Resistance up to 1K may be used if one desires to further limit the short circuit current. Higher voltage capacitors may be used, but do not increase the microfarads!

The circuit, less transformer, was "breadboarded" on a piece of perfboard about 1-7/8" X 5-1/2", with final height less than 1-3/4".

Operation of the "power pack" was checked by connection to an Aeriola Senior. The voltage at the filament terminals, using "A+LO," with the rheostat set at maximum resistance (just turned on) measured 1.5 V. The "B+" was set at about 20 V.

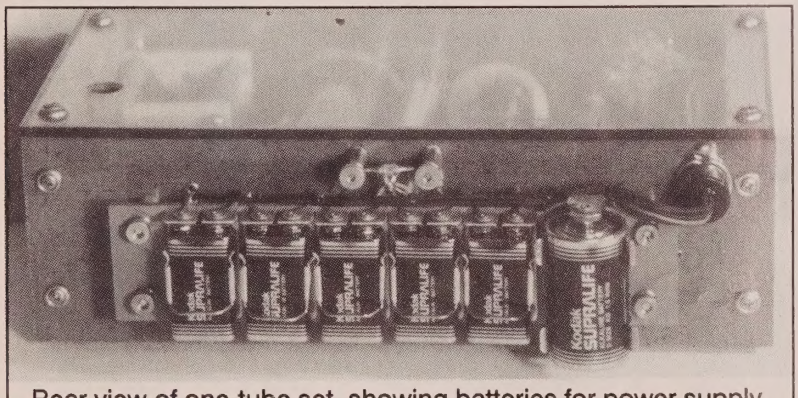
Installation in a small cabinet with a voltage tap switch and a voltmeter is underway. "Build it" and then "plug it in and try it."

Parts list:

C1 to C4: 470 μF, 25 V
C5, C6: 470 μF, 35 V
C7 to C10: 470 μF, 50 V
C11: 4.7 μF, 100 V
C12: 100 μF, 63 V
C13, C14: 10,000 μF, 6.3 V
R1, R3: 330 Ω, 1/2 W
R2: 100K, 1/2 W
T1: 6.3 VCT at 1 A (Thordarson T21F08, pri. at 117 V, or equivalent.)
Diodes: 1N4001, etc., 1 A, 50 V min., Radio Shack #276-1653.

A SIMPLE A & B POWER SUPPLY

Bob Ryan
Box 3039, Anaheim, CA 92803



Rear view of one-tube set, showing batteries for power supply. Nice craftsmanship all around.

I recently built an Interflex one-tube receiver as popularized by Hugo Gernsback in the mid-20s. Not having an AC power supply, I turned to the original method of batteries. A simple approach is to place five common 9-volt batteries in series, which provides 45 volts for the plate supply, and to use a single 1.5-volt "D" cell for the filament.

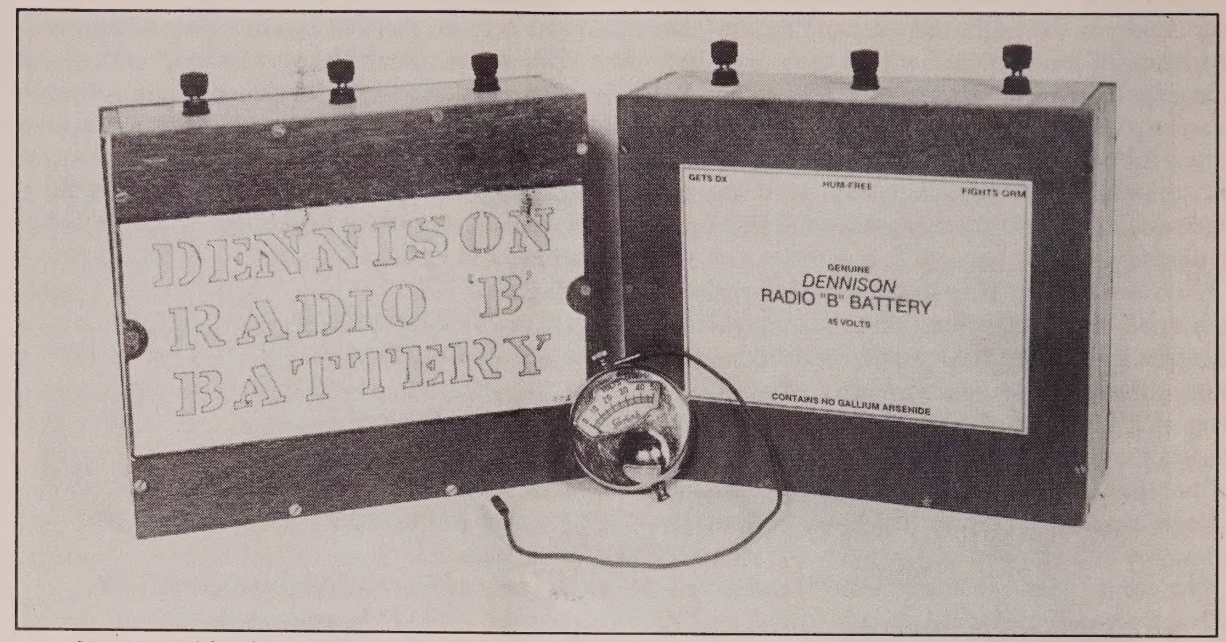
The Interflex detector is somewhat conventional, except that the usual condenser and gridleak combination in the grid circuit is replaced with a crystal detector. I used a modern diode. I found the 3Q5 an excellent choice for a regenerative detector, since it requires only 1.4 volts on the filament, ideal for the 1.5-volt battery. The plate is left "floating," with the screen used as the plate.

MAKE YOUR OWN 45-V B-BATTERY

Bob Dennison, W2HBE
82 Virginia Ave., Westmont, NJ 08108

I like to build and operate old-time radios. To operate these sets, you need either B-batteries or a B-eliminator. After building several eliminators, I decided it was time to try batteries. Back in 1936, you could buy a Burgess No. 10308 heavy-duty B-battery for $1.52. Now, a pair of them will set you back nearly $100. Thus, I decided to see if I could make my own.

The standard 45-V B-battery consists of 30 D-size cells wired in series, tapped at the 15th cell. The cheapest Radio Shack D-cells cost 37¢ apiece so the cost of 30 would be $11.10. Not bad. At least once a year, these cells go on sale at 18¢ so the cost comes down to only $5.40. Great! Sometimes the Radio Shack alkaline cells go on sale at a 40% discount. Then 30 alkaline D-cells would



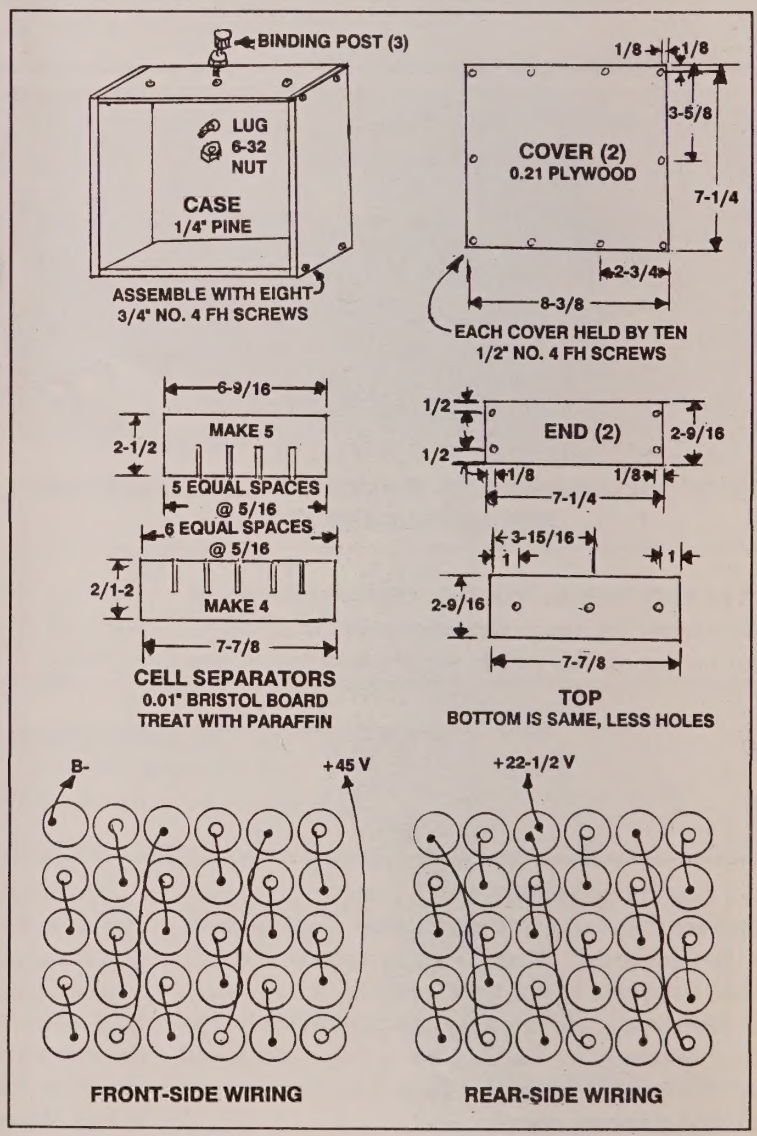
cost $21.45. This gives a premium-quality, long-life B-battery at less than half the cost of a commercial unit. I decided to build one of each.

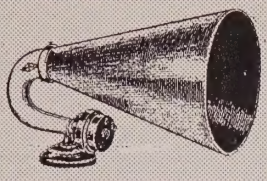
My homemade battery is housed in a wood box. The front and back covers, made of 0.21" thick plywood, can be removed to replace the cells when they run down. The top, bottom and two sides are made of ¼" pine. See the drawing for details.

To minimize the chance of shorts between cells, they are nested in a grid of interlocking horizontal and vertical separators made of bristol board, similar to the way wine bottles are packed in cardboard boxes. Before assembly, the bristol-board separators are treated in melted paraffin to render them moistureproof.

Standard B-batteries usually have Fahnestock clip terminals for B-, +22½ V and +45 V. Mine are equipped with insulated binding posts. The B- and +45 V wires are dressed to the front of the battery and the +22-½ V lead comes out to the rear. A piece of 2" wide cloth tape covers and insulates the solder lugs.

Assemble the four members of the battery frame and lay it back-side down on the back cover. Assemble the bristol-board grid and drop it into the frame. Now place a D-cell in each receptacle, observing the polarities shown in the wiring diagram for the front side. Wire the front side and install the front cover. Turn the unit over, using the back cover to hold the cells in place. Now wire the back side and install the back cover. Test the battery with a voltmeter. Glue a label near each terminal to indicate B-, +22-½ V and +45 V. Design your own personal logo or name plate and glue it to the front cover. You're now ready for some really hum-free reception!





THE LOUDSPEAKER

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H. H. FROST, CTS, AND THE MUSETTE RADIO HORN SPEAKER

Herbert H. Frost, Inc., of 154 West Lake Street, Chicago, had been running ads in Radio News magazine since March of 1922. His product line included radio-set accessories and such parts as headphones, phone plugs, jacks and tuning coils. In November of 1924, a full-page Frost ad promoted a horn speaker for the first time. Called a "Musette," it came in three styles. The cheapest unit was finished in black and priced at $12.50, with two more expensive units finished in silver or gold at $20.00. Superlatives in the ad said "There are no degrees of tone or pitch which MUSETTE w i l l not reproduce faithfully and accurately, without distortion or harshness."

The Musette had a cast-aluminum throat and base. The bell was a single molding of polished bakelite and the neck was a straight design (see the cover photo). Frost's designations of the model numbers were: No. 10B, black stipple finish with black bell; No. 12S, florentine silver finish with black bell; and 13N, Etruscan gold finish with maroon bell. All bells had "Musette, Frost Radio" in raised letters on the inside lower lip of the bell. T h e aluminum-cup driver housing had the same lettering on the back. The polished bell was a unique feature and the horns are, indeed, very collectable.

Herbert H. Frost, 1923.

And now, the rest of the story . . .

From the book A History of CTS Corporation, 1896-1986 written by James Soltow, the following is quoted about the history of Chicago Telephone Supply Company (CTS). (Ross Smith, Director of the CTS-Turner Museum, supplied me with a copy.) "Herbert H. Frost, a buyer with Sears, Roebuck and Company * * * resigned his position at Sears to form the Herbert H. Frost Sales Agency. His plan was to package a kit containing all the parts needed for the assembly of a radio receiver. * * * Frost needed a complete set of components for his kits. * * * Chicago Telephone Supply Company, hit by the recession of 1920-1921, needed business. * * * Floyd Best [CTS president] and Herbert Frost had become acquainted prior to WW I in connection with the distribution of Chicago Telephones through Sears, Roebuck. * * * Best and Frost worked out an agreement, probably in 1921, for Chicago Telephone Supply to manufacture components to be sold under the Frost name. * * * Floyd Best hired additional engineers to design a stream of new products to meet the needs of the Frost agency. * * * The Chicago Telephone Supply catalogs of 1923 and 1924 contained a multitude of items, including headphones, antenna switches, and a complete line of rheostats. All of these were sold under the Frost name. * * * In 1926, Best decided to purchase the Herbert H. Frost Sales Agency, which then became the sales division of Chicago Telephone Supply." In addition to CTS, which made many parts for Frost, Frost purchased parts from at least four other suppliers, such as tubes from Cunningham and parts from Remler.

Ross Smith, who had worked at CTS for 43 years, could find no record of CTS making a horn in the 1920s. Ross, in December of last year, visited with Basil Turner, who was active in CTS for 50 years, having risen to president and chairman of the board. Mr. Turner well remembers the horn product as part of an inventory CTS performed circa 1926. Mr. Turner is sure CTS did not make the Musette horn but does not know which supplier to Frost did make it. He believes the company was based in the Chicago area.

Pictures by courtesy of Ross Smith, Elkhart, IN, and the CTS-Turner Museum. Cover photo by Joe Carlson, N9GDE.

THE WW I NAVY EQUIPMENT-IDENTIFICATION SYSTEM

A numbering system was devised by George H. Clark in 1916, while he was employed at the Washington Navy Yard, as a means of identifying equipment manufacturers. It was fully applied by mid-1917. Examples are the Marconi CM-294 and National Electric Supply Co. CN-239 receivers. The system was long-lived, with such later manufacturers as Zenith (CZE) and RCA (CRC) added when they received Navy contracts. Echoes of the coding system lasted even after WW II, when military tubes continued to be coded JAN-*CG*-813 (for GE production) and the like. However, after WW I, companies preferred their own prefixes for commercial equipment, such as "IP" for Wireless Specialty Apparatus Company. As of 1919, the list included the firms listed in the box.

Numbers were originally assigned by the Bureau of Steam Engineering, as it was in charge of furnishing radio equipment for the Navy in the early days. All numbers for gear made from Navy drawings had the prefix SE. Numbers assigned to private companies for manufacture with their designs had the letter "C" and an additional letter or two designating the company. As an example, condensers made by Dubilier could be marked CD-53. All type numbers ran in one continuous series numerically, whether assigned to Navy yards or to private companies.

The fact that a certain number assigned to one company appears on a name plate does not necessarily mean that this company actually made the piece of equipment, but that the original design was made by that firm and accepted by the Navy. After that, when bids were asked for constructing and furnishing the equipment, some other company might be the low bidder. So once the type number was assigned, it was used on that particular apparatus, no matter the actual maker. This has been confusing to collectors of old gear.

In the case of subcontractors, the prime contractor's number was used. On one corner of the nameplate an additional letter was stamped to identify the subcontractor.

If a modification of the original drawing was made, the suffix A was added to the number. Thus, for a ½-kW submarine transmitter for which Emil Simon was prime contractor, with Kilbourne and Clark the actual maker, after one major change on the blueprint, the type number on the nameplate would be CE-606A. One corner of the plate would be stamped "K" for Kilbourne and Clark.

The list of manufacturers is a corrected version of the one in the History of Communications-Electronics in the U. S. Navy. This article adds material by Bruce Kelley to an article in OTB Vol. 14, No. 3, by Bob Palmer, W7RD.

CA	American Radio Research Corp.
CB	Crocker-Wheeler Co.
CD	Dubilier Condenser Co.
CE	E. J. Simon
CF	de Forest Radio Tel. & Tel. Co.
CG	General Electric Co.
CH	Electrose Insulator Co.
CK	Kilbourne and Clark
CL	Fritz Lowenstein
CM	Marconi Wireless Telegraph Co. of America
CN	National Electric Supply Co.
CO	Copely Manufacturing Co.
CP	Cutting and Washington
CQ	International Radio Telegraph Co.
CR	Wireless Specialty Apparatus Co.
CS	Sperry Manufacturing Co.
CT	Federal Telegraph Co.
CU	Miller Reese Hutchinson
CV	Weston Instrument Co.
CW	Western Electric Co.
CY	Wireless Improvement Co.
CAB	Baldwin Telephone Co.
CAC	Central Telephone Co.
CAD	Domestic Manufacturing Engineering Co.
CAE	Cutler-Hammer Manufacturing Co.
CAF	John Firth
CAG	General Radio Co.
CAH	Cutter Manufacturing Co.
CAJ	Holtzer-Cabot Electric Co.
CAK	William J. Murdock
CAL	Locke Insulator Co.
CAM	Manhattan Electrical Supply Co.
CAO	Sangamo Electric Co.
CAD	Ward-Leonard Co.
CAP	Frank B. Perry
CAQ	Robbins and Myers
CAR	Roller-Smith Co.
CAS	Chloride of Silver Co.
CAT	American Transformer Co.
CAU	Triumph Electric Co.
CAW	C. & C. Electric Co.
CAX	Metropolitan Electric Co.
CAV	Industrial Controller Co.
CAY	Westinghouse Electric Mfg. Co.

EARLY EQUIPMENT PROFILE

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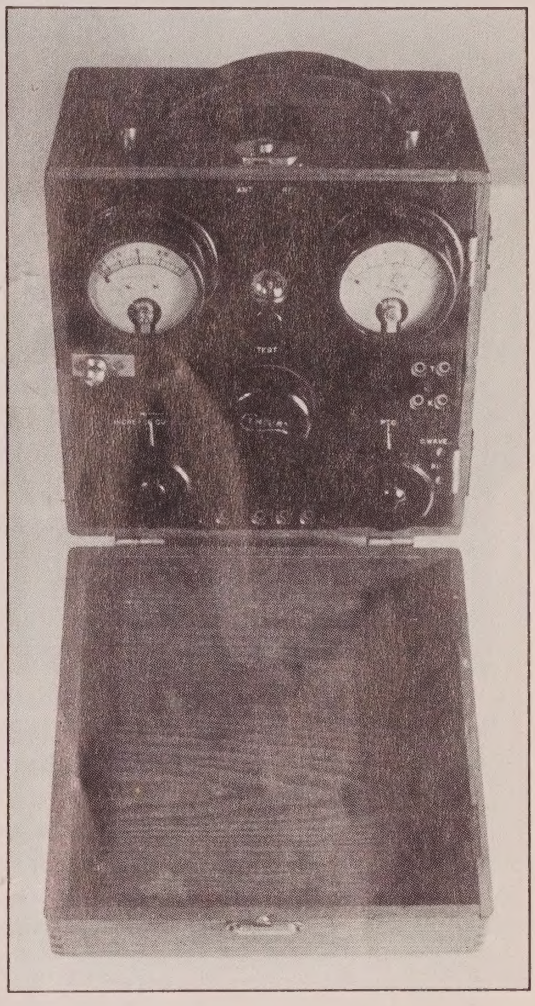
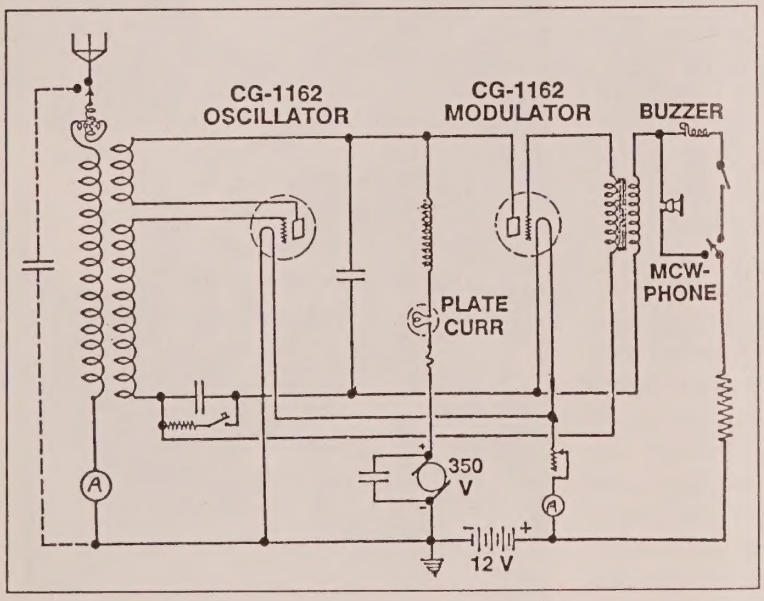
THE NAVY CG-1104A AIRCRAFT TRANSMITTER

The transmitter in the photos was made by the General Electric Co. in 1918. The original design was supplied as CG-1104 and had three tubes, type CG-1162. The equipment was to be used for short-range telephone transmission and buzzer-modulated telegraph operation. Wavelengths available were 335, 375 and 425 meters (896, 800, and 706 kHz respectively). The power supply consisted of a 12-volt storage battery for the tube filaments, with a dynamotor to supply 350 volts at 65 mA to the plates.

The CG-1104A was developed to reduce the size and weight of airborne equipment. With the use of only one modulator tube, the cabinet was reduced in size and the weight lowered from 11 pounds to 8.5. A new feature was CW telegraph transmission, obtained by keying the grid leak of the oscillator.

The front panel contains the send-receive switch, filament rheostat, Century buzzer, filament and antenna ammeters, plate-current indicator lamp, test key, and power terminals. The cabinet is very compact, measuring 8-¼" wide by 8-½" high by only 5-½" deep. Antenna coupling may be adjusted from the inside by changing the position of the miniature variocoupler coils. Note the scales with associated pointers for reference. The tube-socket sub-panel is spring-mounted to reduce vibration and prevent damage to filaments. A capacitor and iron-core choke to smooth out "hash" from the dynamotor brushes occupy the lower half of the cabinet under the tube sockets.





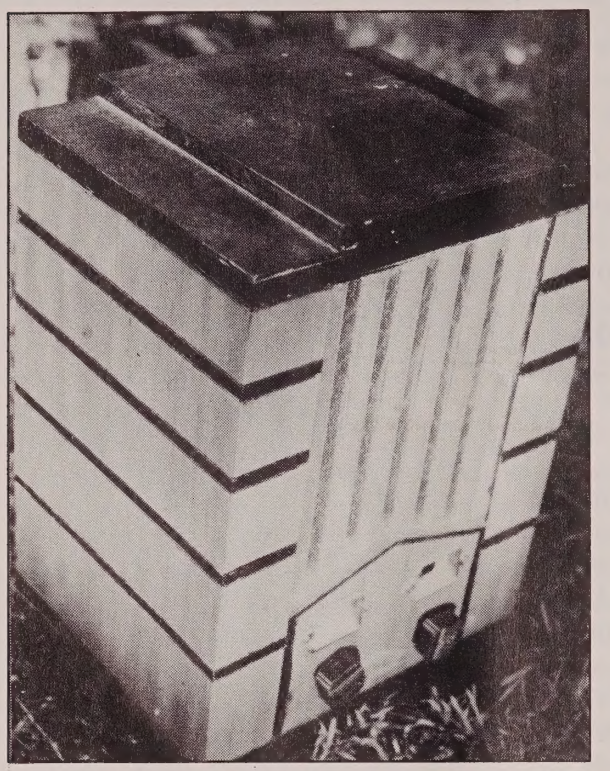
Installed in a seaplane, the CG-1104A was used with a trailing-wire antenna while in flight. Rated range was 60 miles on phone, 75 with buzzer MCW, and 100 with pure CW. Landed on water, the unit operated into a short wire antenna on the skid fin of the aircraft's tail, giving ranges of 20, 30, and 50 miles respectively.

One of these sets flew across the Atlantic in 1919. The article "Aircraft Radio Installations" in the July 1928 issue of the *IRE Proceedings* includes a photo of a CG-1104A installed as an auxiliary transmitter in an NC-series flying boat, of the

(Continued on p. 16)

A LONG WAY FROM HOME: MAJESTIC MODEL 59

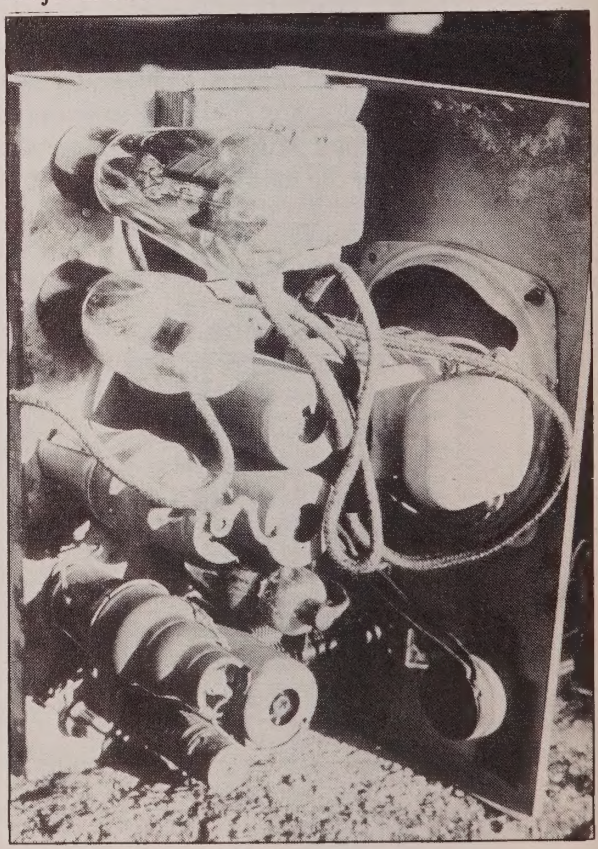
Darryl Kasch
PO Box 660, Maryborough Q4650, Australia

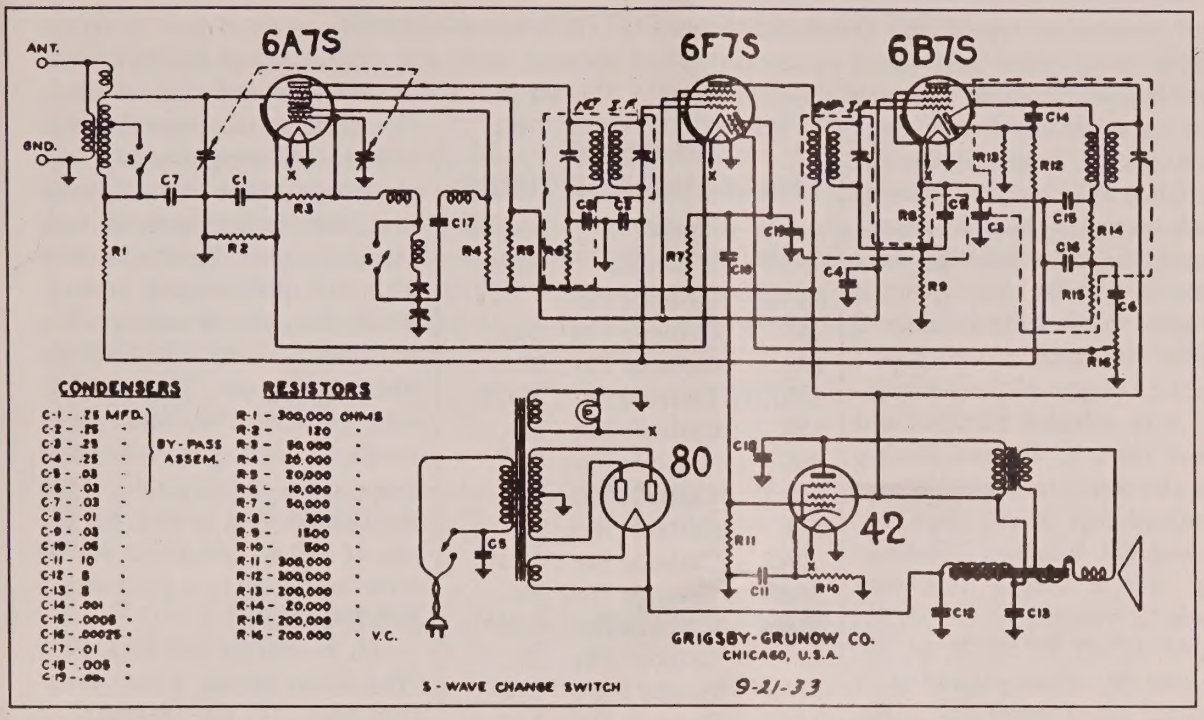


In 1986, I still hadn't started this "disease" known as radio collecting, when an associate of mine brought me to a place where a chap restores gramophones, which had a rather large collection of unrestored radios from different sources like museums and private collections. That's where I sighted the Majestic 59, still working in its unrestored state! How it came to be in Sydney, Australia, your guess is as good as mine. Being a total novice, the next challenge was to find someone who would be able to make it work *correctly*. An electronics shop had a stab at it but, finally, while I was advertising in the local paper for more radios, a chap rang who claimed to be a retired design engineer from AWA (Amalgamated Wireless Australasia) which led me to "yooo beauty"! For I had struck gold. Ray Tonks not only restored my prize, but taught me the tricks involved in restoration from A to Z.

So away I went with cabinet restoration, carefully dodging all crevices, with this most tedious cabinet. Finally, persistence and patience paid off, and it was finished. The circuit from Rider's looks a little like a reflex design, but it's not: it has three IF transformers, two dual-function valves (6F7S-6B7S), but there's more than meets the eye. The similarity to a reflex comes from use of half of the first IF tube as the first audio stage. Fortunately, corrosion wasn't a problem with this set, even with the original factory label still on the inside of the cabinet. One tricky fault was overcome: the aerial was wired back to front, with the broadcast band hooked to the shortwave part, and vice versa. As the photo shows, the chassis stands on end, which was a poor design, allowing this set to tip over on the workbench. Another sign of odd design is the fact that the wavechange switch is located at the rear of the set, near the aerial coil. It could be worse, it could have been tucked under the chassis. The other major battle was replacing the speaker, of which the entire cone flaked to pieces before my eyes. An Australian-made AWA type had to do, as I would imagine any original type Magnavox that might be around would have met with the same fate. Final details: knobs on my set are close but not original: see page 106 of Radios, A Blast from the Past. Three original spray-shielded tubes have been replaced, with conventional Goat shields added on the IF tubes. Majestic's unique self-shielding tubes are mighty scarce today.

It's easy in hindsight to see why Grigsby-Grunow folded after making such sets as this. Despite good performance, the cabinet was far too flimsy, the appearance too glitzy, though, in retrospect, it's sets like this that command frightful figures now. Perhaps that, in a nutshell, is the irony of Majestic radios.





THE VACUUM TUBE

EDITED BY

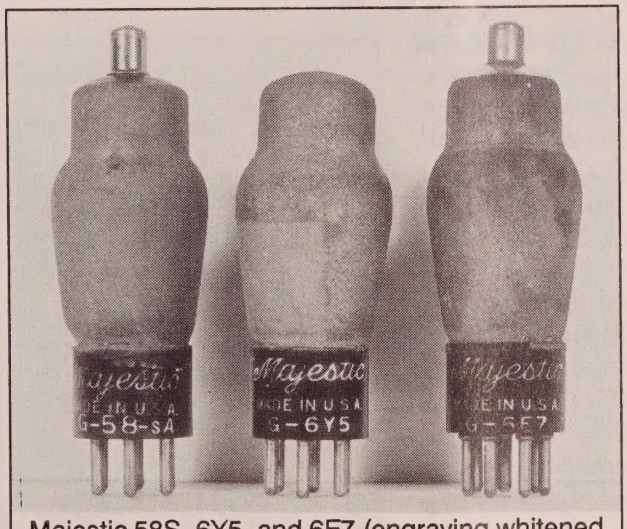
BRO. PATRICK DOWD, F.S.C., W2GK

MAJESTIC AND THE SPRAY-SHIELD TUBE

In 1931 Grigsby-Grunow, maker of Majestic radios, brought a German (Telefunken) innovation into the U. S. tube industry: the spray(ed)-shield tube. With this design, a tube in manufacture received a sand-blasting, followed by a permanent coat of zinc alloy, flame-sprayed through an oxyacetylene torch. The result was electrostatic shielding without an external metal shield, with its bulk and extra assembly labor. As the table shows, a number of standard tubes had shielded versions.

Grigsby-Grunow had its own tube plant. Unfortunately, this development was generally costly. The Depression, with its intense pressure on set makers to cut costs, was no time to introduce a "premium" tube.

As of 1935, Grigsby-Grunow was freshly liquidated and thus no longer available to make tubes or negotiate bulk purchases. Shielded tubes for replacement use were produced, or at least distributed, by the "independent" makers: Arcturus, National Union, Raytheon, and Sylvania, but most or all of these were simply conventional tubes with metal shields permanently affixed. They were list-priced at odd levels: a few cost the same as conventional tubes, but the majority were priced substantially higher, up to 78% more. Of course, radio repairmen commonly substituted ordinary tubes as replacements instead. Spray-shielding vanished from the U. S. industry until Raytheon revived it on a few hearing-aid and other subminiature types in the Forties.



Majestic 58S, 6Y5, and 6E7 (engraving whitened for visibility).

The U. S. Majestic tubes were generally stan-

dard production types, with the shield feature simply being added and wired to the cathode. Certain types required a seven-pin base to terminate the shield lead separately.

In Canada, Rogers Radio Tubes (then affiliated with the Majestic operation) took advantage of the shield to redesign their types 24 and 51: they found it possible to eliminate an internal shield electrode, reducing cost slightly. Rogers also experimented with shielded rectifier and *power* tubes of 80- and 46-size, the idea being to avoid electron bombardment of the glass and consequent localized overheating. For at least a time, they made "S" versions of the 32, 33, 24, 41, 42, 46, 47, 59, 78, 84, 86, 88, and 89. Black-painted octal sprayed tubes eventually came into Rogers' line.

In England, Europe, and Australia, spray shielding was common practice through the Thirties. Makers included Ekco, Ferranti, Lissen, Loewe, Marconi-Osram, Mullard, Philips, Pope, Triotron, Valvo, and, of course, Telefunken as the original developer. Philips even made shielded tuning-indicator tubes. Besides plain zinc, metallic paints (red, gold) were used.

MAJESTIC SPRAY-SHIELDED TUBES

Type	Shield Wired To	Similar Type
2S/4S	Cathode Pin	-
24S	Cathode Pin	24A
27S	Cathode Pin	27
35S/51S	Cathode Pin	35/51
55S	Cathode Pin	55
56S	Cathode Pin	56
56AS	Cathode Pin	76*
57S	Cathode Pin	57
57AS	Cathode Pin	6C6*
58AS	Cathode Pin	58
58AS	Cathode Pin	6D6*
75S	Cathode Pin	75
85AS	Heater Pin 6	85#
2A7S	Cathode Pin	2A7
6A7S	Cathode Pin	6A7
6B7S	Cathode Pin	6B7
6C7	Own Pin 3	85AS
6D7	Own Pin 5	6C6
6E7	Own Pin 5	6D6
6F7S	Cathode Pin	6F7
6Y5S	Own Pin 2	6Z4/84

* "S" tube has 400-mA heater.
# Not identical.

This brings up the question of how to refit a Majestic radio that originally had sprayed tubes. The set just doesn't look original without them. The author has experimented with the following process: take an ordinary tube and cover the area *not* to be sprayed with masking tape. Spray the tube with flat medium-gray enamel. While the paint is wet, sprinkle the tube liberally with ordinary white table sugar. Then respray with paint. The result is a rough-surfaced gray tube that looks close to original! Fine sand would work as well, but the use of salt in electronic equipment would not be a good idea.

REFERENCES

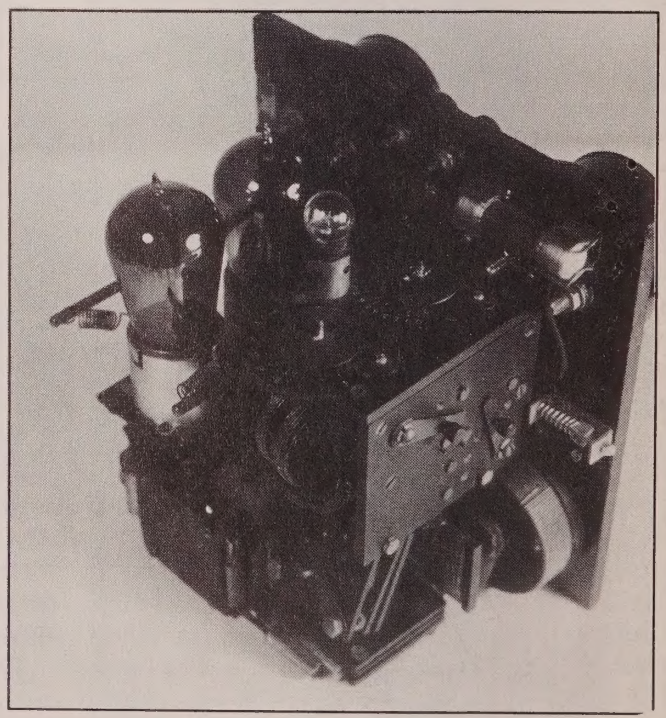
- H. W. Parker and F. J. Fox, "The Spray Shield Tube," *Proc. IRE*, May 1933, pp. 710-720.
- J. W. Stokes, 70 Years of Radio Tubes and Valves, pp. 164, 172, 180 and 185.
- A. S. Douglas, "Majestic Spray-Shielded Tubes," *ARCA Gazette*, Vol. 5, No. 2 (1977), pg. 9.
- "Special Tubes," Mallory-Yaxley Radio Service Encyclopedia, 2nd Ed., 1938, p. 332.
- Tube advertisements, Radio's Master Encyclopedia, 1st Ed., 1935-36, pp. B5-B13. -LAS

(Continued from p. 13)

Installed in a seaplane, the CG-1104A was used with a trailing-wire antenna while in flight. Rated range was 60 miles on phone, 75 with buzzer MCW, and 100 with pure CW. Landed on water, the unit operated into a short wire antenna on the skid fin of the aircraft's tail, giving ranges of 20, 30, and 50 miles respectively.

One of these sets crossed the Atlantic in 1919. The article "Aircraft Radio Installations" in the July 1928 issue of the *IRE Proceedings* includes a photo of a CG-1104A installed in an NC-series flying boat, of the group that attempted the crossing. Next to the set is a hand-cranked reel for the trailing-wire antenna.

GE designed higher-powered versions of this transmitter, including one, the SE-1370, with CG-1144 tubes (early type UV-203 50-watters). Another, the SE-1380, used CG-916 (type "P" 250-watt) tubes. For a photo of the latter, see AWA Review, Vol. 4, p. 28.



"WHAT'S IT WORTH?" - THEN AND NOW

Thirty years ago, in OTB Vol. 2 No. 3, Bruce Kelley printed the results of a survey of equipment values answered by about 50 AWA members. After outlier estimates were discarded, about 3000 data points resulted. Figures were in two ranges: for "average" and "good" condition.

The table below shows the 1961 results, *multiplied by 4.44 to convert to 1991 dollars*. For comparison, the "NOW" column shows sale prices from AWA auctions in the last three years.

The results are striking in some cases. Some items that have supposedly climbed sharply in value have actually risen rather modestly in real terms: spherical Audions have risen by about 8% per year; National SW-3s and AK Breadboards have appreciated about 6% yearly. Meanwhile, the Freshman Masterpiece has stayed flat, as have early call books and copies of "Wireless Age." -LAS.

ITEM	AVG	GOOD	(NOW)
RECEIVERS - WIRELESS & COMMUNICATIONS			
Grebe CR-3, 1919 one-tuber	$20-45	$43-107	
Marconi Type 101 tuner	58-142	120-249	
Marconi Type 106 tuner	51-129	102-200	
Marconi Type 107-A tuner	62-155	115-231	
Marconi multiple tuner	124-346	209-532	
Murdock loose coupler	15-32	24-58	110
National SW-3, 2 coil sets	20-58	58-76	360
Paragon RA-10 tuner, 1920	24-67	44-104	425
United Wireless Type D tuner	65-160	111-266	
Westinghouse Type "R" series	29-67	58-98	
Wireless Specialty IP-76	60-164	89-289	
Wireless Specialty IP-501 (SE-1420)	56-102	78-200	550
Wireless Specialty IP-500 (SE-143)	44-102	84-191	
Wireless Specialty IP-501A	53-104	98-209	
RECEIVERS - BROADCAST - TWENTIES			
Atwater Kent Model 10 breadboard	29-63	47-95	430
Fada 160 reflexed neutrodyne	16-37	29-58	
Freshman Masterpiece three-dialer	12-38	24-51	47
Grebe Synchrophase three-dialer	16-41	35-80	310
Home-made two-tuber	7-18	13-30	
SPARK GEAR			
Benwood rotary gap (w/o motor)	22-50	43-76	
Blitzen (Clapp-Eastham) 250-watt xfmr	19-40	34-75	
Chambers rotary gap (w/o motor)	34-62	52-98	
Fixed gap on marble or slate base	9-27	18-32	
Marconi 10" spark coil	59-182	111-266	
Murdock "mud" condenser (0.0017 μF)	5-11	9-16	
Thordarson 1000-watt transformer	20-40	36-67	
MISCELLANEOUS			
Boston key	16-31	24-42	55
Bunnell "sideswiper" key	13-26	20-36	
Electro Importing "10-cent" crystal det.	2-5	4-9	70
Honeycomb coil, 1000-turn, w/mount	4-7	6-11	
Magnavox horn spkr (early, ext. field)	13-26	27-47	260
Omnigraph, 5-disc type	15-31	24-53	360

ITEM	AVG	GOOD	(NOW)
TUBES			
Audiotron (cylindrical, no base)	5-13	9-25	85
de Forest Audion (spherical)	25-55	43-95	650
de Forest "H" (transmitting)	4-12	9-25	150
Electron Relay (cylindrical, no base)	5-13	10-21	75
GE "P" Tube (early UV-204)	9-20	15-36	
Myers Audion	3-10	7-13	80
RCA/GE UV-201	3-6	4-7	10
RCA UV-202 "five-watter"	4-10	7-17	18
RCA UX-210A	2-4	2-6	12
Schickerling S-300	3-6	5-12	
Western Electric (Army) VT-1	4-9	7-12	13
Western Electric (Army) VT-2	4-10	8-15	
Welsh "Dollar Detector" (Peanut)	4-22	6-23	85
MAGAZINES			
QST, 1916	35-67	49-107	
QST, 1920	5-13	9-21	
QST, 1925	3-4	5-12	
QST, 1930	1-3	3-5	
Radio News, 1921	2-6	4-9	
Radio News, 1928	1-3	3-6	
Wireless Age, 1916	2-7	6-13	6, 12
BOOKS			
ARRL Handbook, 1st ed., 1926	9-20	5-36	50, 90
Electro Importing Co. catalog, 1915	8-19	16-38	
Government Call Book, 1913 (first)	8-22	17-39	
Government Call Book, 1921	5-13	10-24	19
Government Call Book, 1930	4-11	7-12	13
History of Radio to 1926, Archer	12-24	18-42	
Manual of W'ls Tlg'y, Robison, 1913	8-22	15-35	
Marconi Yearbook, 1914	26-36	33-61	155
Radio Telephony, Ballantine	4-10	8-17	
Practical Wireless, Bucher	4-9	9-16	
William B. Duck Catalog, 1917	5-13	9-22	
200 Hundred Meters and Down '36	8-15	13-26	

WIRELESS TO RENT:
THE FIRST MARCONI MARINE TRANSMITTERS ON SHORT WAVES

Dr. Desmond Thackeray
7 Beech Close, Byfleet, Surrey, KT14 7PS, England

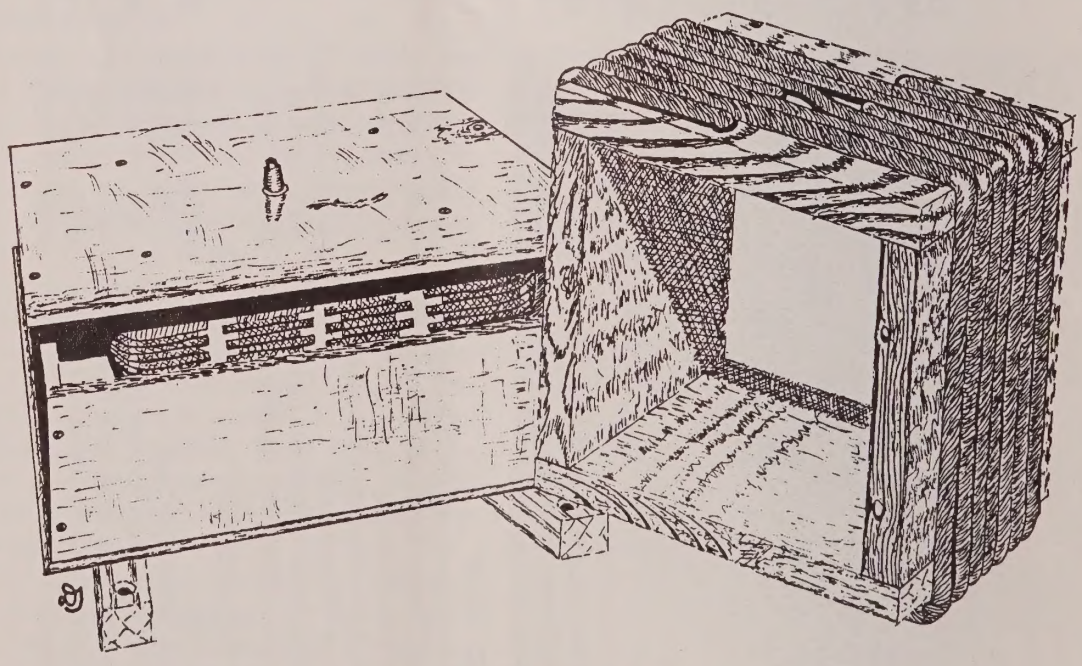
Marconi's intentions for marine radio came to fruition by way of land-based transmitters with double-tuned RF transformers called "jiggers," (see the figure) wound with power cable on square wooden formers. For shipboard use the jigger increased in size and was cased in a wooden box with terminals. One of these cased jiggers is fixed to the back wall in the view of the radio room of the SS Philadelphia on page 109 of Thorn Mayes' book [1], while visitors to the UK may have seen the earlier uncased version in either the Science Museum or the Marconi Museum (also depicted on p. 107 of G. G. Blake's magnum opus [2]). I do not know of any intact example of these early transmitters to be seen today, and very little technical information was published on them. Yet as recently as the Marconi International Marine Jubilee in 1950, the Company assembled the contents of a 1900 ship's radio cabin and put it on display at the Baltic Exchange, London. A photograph of this exhibit is to be seen in the Science Museum booklet on marine radio history by Pocock & Garrett [3]. Most of the components of the spark transmitter were not unusual or "dedicated" items; the Morse key, the Leyden jars, the spark coil and the batteries one might have found in laboratories over a long period and are not so rare in collections today.

THE JIGGER

Not so, however, the transmitting radio-frequency oscillation transformer or "jigger," which was developed empirically by the Marconi Company solely for this purpose, and now seems very rare indeed. Indeed of the five patterns of early Marconi transmitting jigger depicted in various published sources, I have seen in the flesh just two examples of the earliest unenclosed design and a single example of one of the designs in a wooden box that was displayed in 1950. This latter jigger has been on loan to the Science Museum in London from the Marconi Company since 1959. Since it affords virtually the only remaining clue to the RF design of the 1900 Marconi marine transmitter, I recently measured the inductance and stray capacitance of the secondary or antenna winding. I am much indebted to the Museum staff for help in this, and also to the Marconi Co. for permission to handle the item. For the record, my measurements fitted an inductance of 102.6 microhenries and stray capacitance of 23 picofarads. Thus it would be self-resonant at 3.276 MHz and capacitive above that frequency.

THE FREQUENCY

The primary and secondary windings are fixed-coupled, and, with hindsight, are drastically over-coupled. This would have given rise to obvious



Marconi transmitting jiggers: left, 1900; right, 1898.

twin-wave operation had the two windings been tuned to exactly the same frequency. However, such precise tuning would have been difficult; so the chances are high that the two windings were tuned to slightly different frequencies. So the double-humped radiation distribution could have been very lopsided, with the more powerful peak the more useful of the two. The wavelength of "Tune A" was usually given as 60 meters, though it is unlikely that it could have been measured before Round's wavemeter-calibration work later in the decade. Thus if, as is clearly not wholly certain, the antenna and the jigger winding resonated at 5 MHz, the reactance required of the antenna-ground combination at this frequency to resonate with the jigger would have needed to be j2425 ohms.

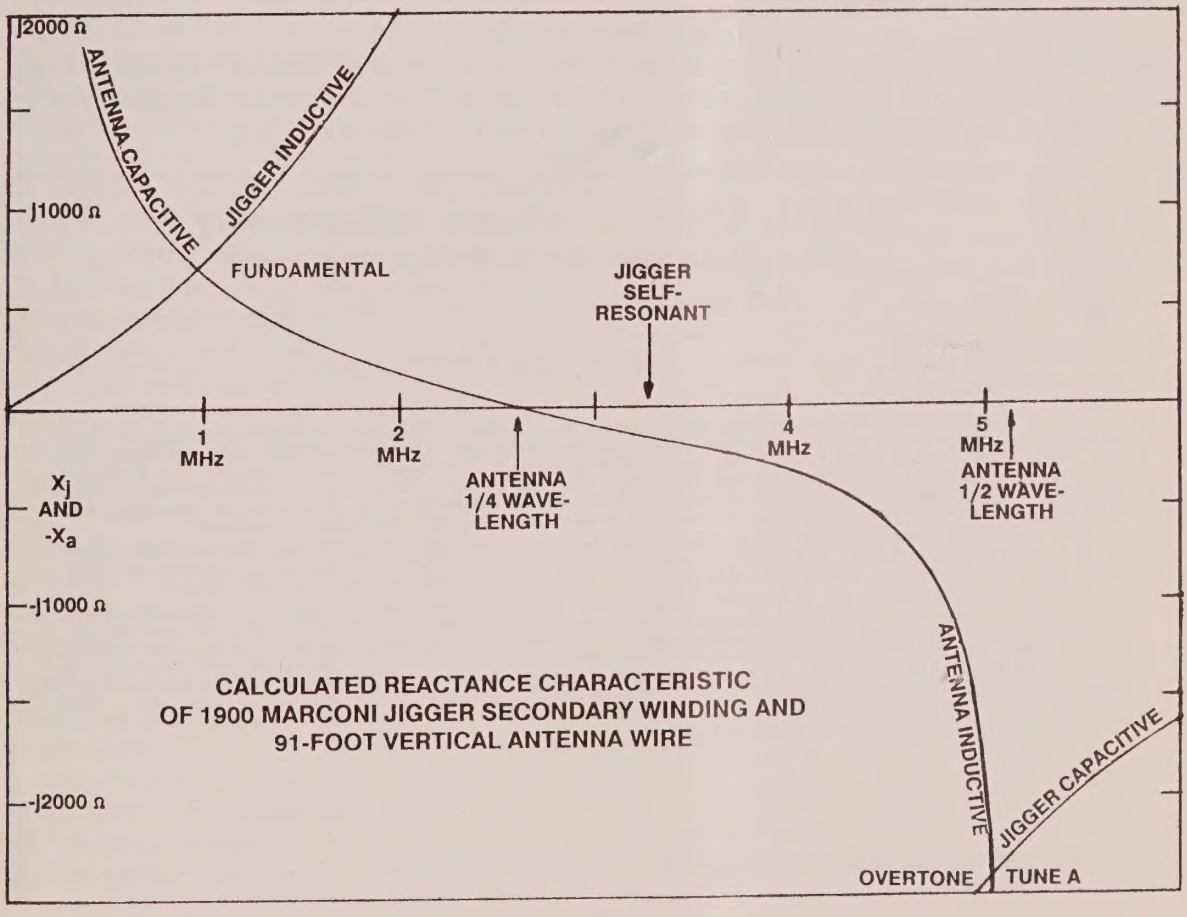
THE ANTENNA

On land, Marconi had been using vertical wires of up to 100 feet, and could also rig these on ships with tall masts. The masts on the SS Philadelphia look to be not much less than 150 feet. On small boats, only a shorter length of the wire could have been rigged vertically; so was the rest of the wire brought down to run horizontally if a long gaff at the mast-head was impracticable? Marconi probably used stranded power cable for antenna wire as well as jigger windings, and in a typical diameter of 60-m wavelength this would have a free-space characteristic impedance Z_0 of, say, 450 ohms. The proximity of the "hot" lower end of the antenna to its image would augment its free-space capacitance drastically; so for a purely blind guess how about an actual Z_0 of 212 ohms? A half-wave radiator at 5 MHz would be around 93½ feet in length; but the actual wire needs to be shorter yet, only 91 feet to give the right inductive reactance of j2425 ohms. Note that Z_0 is not very sensitive to wire diameter, nor is the wire length very sensitive to Z_0. So the result of 91 feet is not likely to be much in error. On the other hand, the actual resonant frequency clearly varies significantly with wire length, but might have been accommodated to some extent by using a jigger with a different number of secondary turns.

I have drawn a reactance diagram (below) that shows qualitatively the reactance matching at around 5 MHz. There is also of course a "fundamental" match of antenna and jigger reactances at about 959 kHz, where the antenna is effectively much shorter than a quarter wavelength. This is close to the wavelength of 300 meters which in due course became the "Tune B" of the Marconi marine transmitters, or the shorter of the two wavelengths for later ocean-going rigs.

JIGGER PRIMARY

The primary tuned-circuit had a much lower L/C ratio, the spark capacitance being provided by a bank of Leyden jars in series-parallel configuration, while the inductance was a turn or two of wire on the jigger plus substantial stray inductance in the leads. This stray reactance does help



CALCULATED REACTANCE CHARACTERISTIC OF 1900 MARCONI JIGGER SECONDARY WINDING AND 91-FOOT VERTICAL ANTENNA WIRE

to reduce the overall coupling constant from spark circuit to antenna circuit; but in these earliest transmitters there seems to have been no organized method for adjusting the coupling. The primary tuning could certainly be adjusted by changing the number and/or configuration of jars, though these themselves could have shown wide variations in capacitance unless pre-selected. It certainly looks as though the operator had no way of tuning the transmitter. And perhaps he had no need to, once the Marconi installation engineers had finished the installation and had checked it "on the air." There is some advantage here, in that fixed tuning with no antenna loading coil to adjust meant lower capital costs. But also the operator could not easily mistune the transmitter, accidentally or intentionally. The problems and the cost of tuning to 60 meters must then have been with the installation engineers, though how they juggled the variables of Leyden jars, jigger secondary turns, wiring disposition and the antenna length and shape we can only guess.

AND AFTER THAT?

With the benefit of hindsight I have already mentioned the possibility of bending any excess antenna wire down to the horizontal and taking it in the direction of an adjacent mast. This is the kind of empirical solution an intelligent engineer would undoubtedly try when faced with short masts; back then to the key, and if all was well the Marconi Company had effectively invented the "inverted L" antenna. As far as I can see from the picture in Hancock's book [4], written for the 1950 Jubilee, the SS Philadelphia had a near-vertical wire some 90 feet to a point on the foremast, continued as a near-horizontal wire back from there to the main-mast, perhaps 150 feet to the rear. In the wireless cabin picture already cited, along with the rather unusual jigger with four front terminals, there is a hank of additional wire on a rack; so clearly much longer wavelengths were being explored for ocean-going vessels.

SOURCES

1. Wireless Communication in the United States, Thorn Mayes, New England Wireless & Steam Museum, 1989.
2. History of Radio Telegraphy & Telephony, G. G. Blake, Arno Press facsimile, 1974.
3. The Origins of Maritime Radio, R. F. Pocock & G. R. M. Garratt, Science Museum, 1971.
4. Wireless at Sea, H. E. Hancock, Marconi International Marine Co. Ltd., 1950.

FB SIG, OM?

Alan Douglas recently came up with an unused ARRL Official Observer postcard - a *penny* postcard, no less - from 1937. The wording is a catalog of the ills that befell the less modern transmitters of the day, or the rigs used today in AWA events like the OT Contest! Everything but TVI.

A.R.R.L. COMMUNICATIONS DEPARTMENT

OFFICIAL OBSERVER'S NOTIFICATION FORM

Dear.....Your signals were.....at.....M.....ST.....

when you were calling / working .....You were using a frequency of.....kc.

Your note was.....

Federal Communications Commission monitoring stations in each district have new amateur-band equipment. They are measuring frequency and checking violations of all amateur regulations. *License suspensions and revokations have been made, where warranted, in a number of cases.* The purpose of this friendly notice is to help you avoid the danger to your individual operating rights that may result from off frequency operation, use of an improperly broad signal, etc. The carelessness or disregard of one individual cannot be permitted to jeopardize the enjoyment and rights of all amateurs. Your cooperation is requested in maintaining a high standard of operations.

The government presupposes in issuing licenses that adequate equipment and intelligence will be used. *Have an up to date frequency meter! Calibrate this with A.R.R.L. standard-frequency transmissions (schedules in QST). Check frequency before you start transmitting—and after each change in frequency! Make it a habit.*

There's always a reason for off-frequency operation or other violations, *but no excuse.* Carelessness causes much trouble. Look for parasitics and harmonics due to improper adjustment. Too much plate and grid voltage, the wrong "leak," unbalanced load or excitation in P.P. sets, may cause strong harmonics. Check plate supplies, improve filters, use proper choke and condensers, loosen ant. coupling. Adjust the transmitter *while listening*—in remedying or bettering a poor note. An electron coupled frequency meter can be used as a listening monitor too—to check the note for clean keying, or for frequency stability. Build one . . . or do you have one? How about it? Would welcome an affirmative line from you with dope on your trouble—to help others. Let's fix the note or frequency today, what say OM?

Sincerely,

.....
Address

.....
A.R.R.L. Official Observer

4M-3-37

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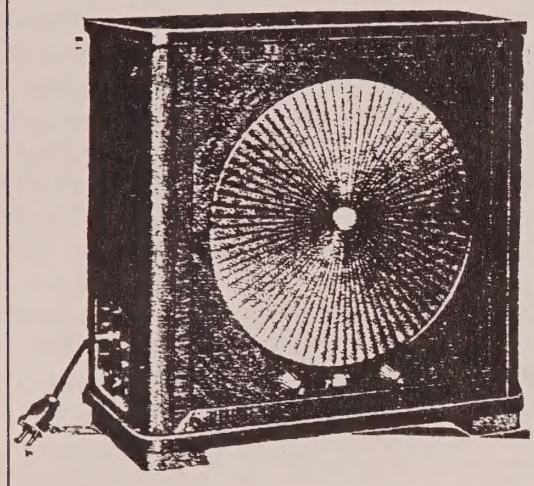
LOEWE VALVES REVISITED

Pat Leggatt
Garretts Farm, Pankridge St., Crondall, Farnham, Surrey GU10 5QU



EB100, 1931, from *Wireless World*

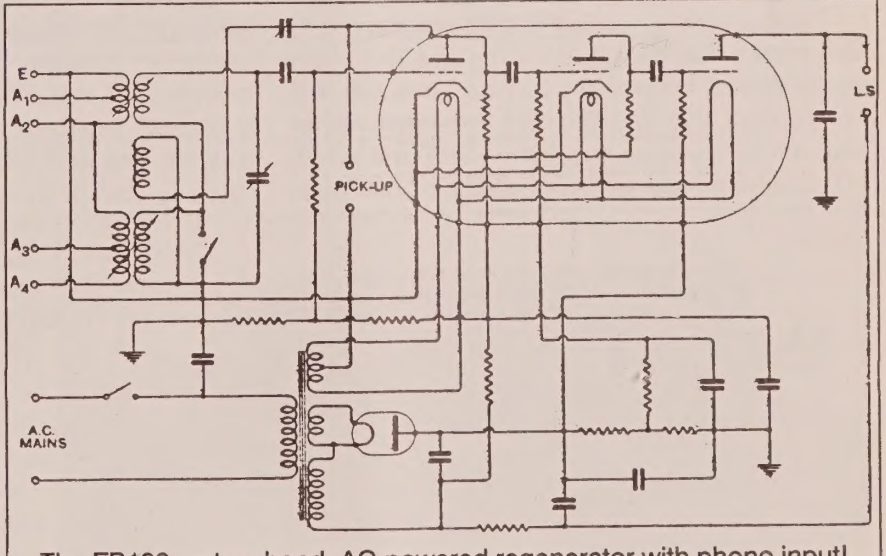
The German Loewe multiple valves and some receivers using them have been well documented in previous OTBs [1], but it may be of some interest to add a few more details and to describe a Loewe receiver not mentioned so far.

First, to the valves themselves. The original three-triode 3NF (*Nieder Frequenz*, Low Frequency) had the anode of the first triode brought out on an unterminated wire through the glass pinch. Connection to this wire could have been made through the hollow valve base, but it was left unconnected in the OE333 receiver. A new version of the valve was soon produced with this lead connected to a contact disk in the center of the base, the type number in Germany being 3NFB. In England this version was designated RNF7, presumably in recognition of the fact that there were now seven connections to the valve rather than the former six. This new version was used in the RO433 receiver in which the first stage was a regenerative leaky-grid detector; in the earlier OE333 the detector configuration was anode-bend and of course non-regenerative [2].

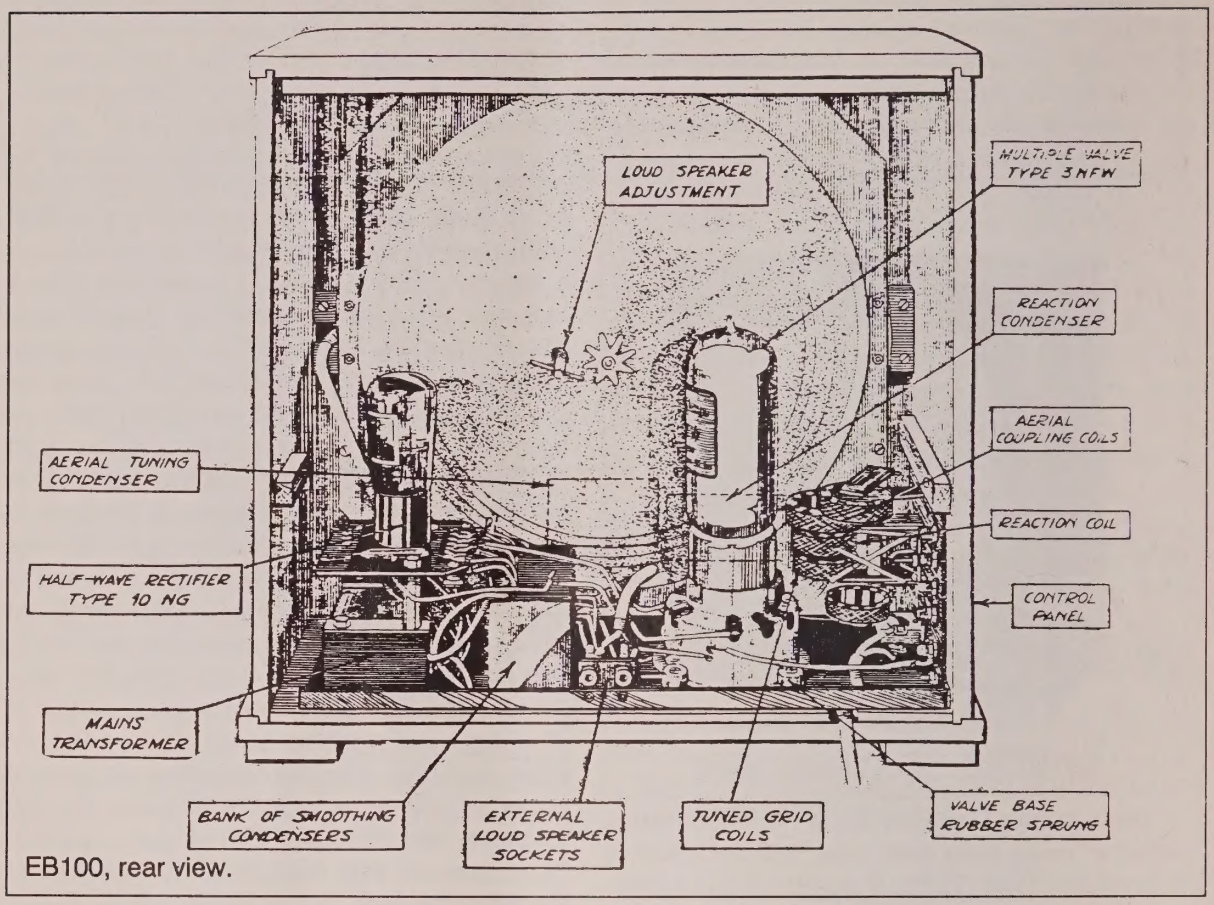
In the English technical press of the period there are accounts of proposed Loewe valve variations which, in the event, do not seem to have gone into actual production. First, there is a description of a two-part 3NF in which a top section contains only the three triode electrode assemblies [3]. This top section "fits snugly" into a lower section - a separate evacuated glass envelope - containing the coupling resistors and capacitors, the whole forming a combined unit with dimensions similar to those of the 3NF. The idea was that only the top section needed replacement or repair in the event of filament failure, thus keeping costs down.

The second variation arose from the quoted fact that the 2HF (*Hoch Frequenz*, High Frequency) valve incorporating two space-charge tetrodes "has not been found completely satisfactory where several such valves are to be used in series" [4]. The suggested solution was to be a two-triode valve complete with R-C coupling components, rather surprising in a device intended for high-frequency amplification. The magazine says that "Specimens of this type have reached us from Germany for test, but manufacture in England has not yet commenced." No doubt it never did!

Another possible variation which did not come into production was put forward by Dr. Siegmund Loewe in his British Patent No. 28370/26 dated November 8th, 1926. Dr. Loewe was clearly concerned about the hazards of having three filaments in one envelope; this patent suggested the use of cold cathodes for the first two stages, which require only very small anode currents, with a conventional incandescent filament for the power output stage. The cold cathodes were to be of some photoemissive material such as selenium,



The EB100: a two-band, AC-powered regenerator with phono input!



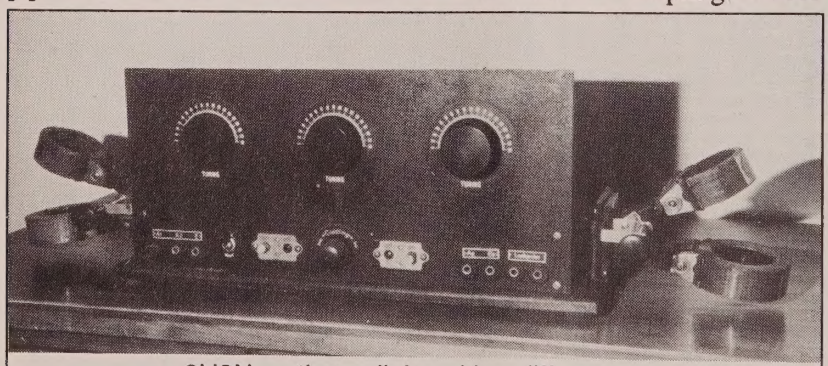
EB100, rear view.

illuminated by light from the last-stage filament. An alternative proposal was to place the cold cathodes in the path of some of the electrons emitted from the incandescent filament and thus to secure secondary emission from the cathodes to operate the first two stages.

Finally on the valves, the earlier OTB articles mentioned the 3NFW, a spray-shielded version of the 3NF with indirectly heated cathodes for the first two stages, intended for AC mains operation. This valve, plus an half-wave rectifier, can be seen in the Loewe EB100 receiver of 1931 illustrated here [5].

Turning now to earlier Loewe receivers, it is well known that the OE333 using one 3NF valve was produced in Germany in 1926. It is less well known that, also in 1926, they presented a five-stage model incorporating both a 2HF and a 3NF [6]. Loewe wished to secure a slice of the lucrative British market, but patent difficulties prevented this for some years, until early 1929 when they were able to establish a receiver manufacturing plant in Tottenham, north London. There they produced RO433s and the EB100 mentioned above, amongst others. The British-made version of the 2HF + 3NF receiver that I own was produced in Tottenham in 1929 and is designated Model 2H3N; it appears to be virtually identical to the original German version of 1926.

The circuit is shown in the diagram and has one or two features of note. It incorporates three tuned circuits and selectivity is accordingly very adequate. The earlier 3NF valve is used, with anode-bend detection and no regeneration, but provision for regeneration is made by the variable "coupling" capacitor between the detector grid and the first HF stage input. Incidentally, this coupling control in the original German production was evidently labelled "fest" (tight) and "lose" (loose). The translator's German-English dictionary gave "fast" as a synonym of "tight" (as in "stuck fast") so the control in my set is rather pleasantly labelled "fast and loose."


2H3N: a three-dialer with a difference.

As can be seen in the photograph, all coils are plug-in; all four must be changed when a different waveband is wanted.

What with this and three tuning controls, there must have been every incentive to stick loyally with the station you first thought of!

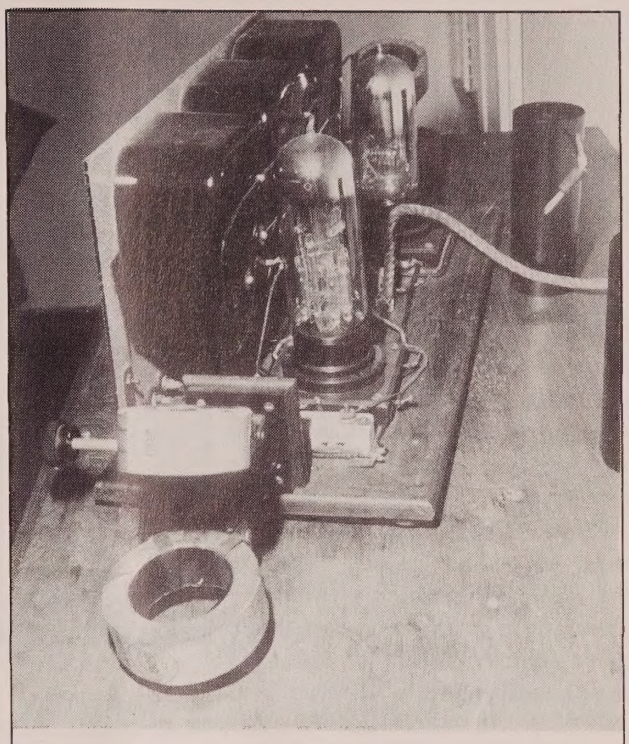
Two other features are rather curious. First the aerial tuning switching enables the capacitor to be connected either in parallel or in series with the tuning coil. The switch is labelled "short" and "long." One would imagine that, as was common practice in the 1920s, this was to cater to different sizes of aerial. But "short" is the series condition and "long" the parallel, which seems the wrong way round.

Finally the A_0 and E_0 sockets provide for use of the set with the 2HF valve switched off or absent, presumable to economize on valve and battery usage when only local-station listening was wanted. One hopes that the user instructions recommended unplugging the +82.5 V battery feed in these circumstances.

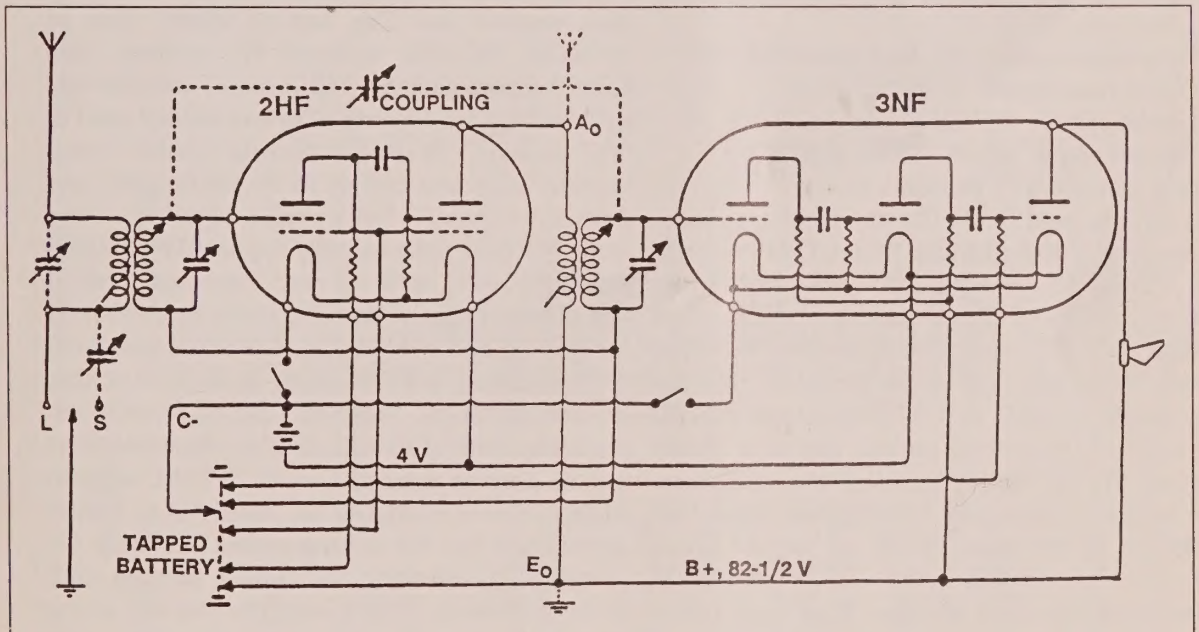
References

1. OTB, Vol. 28 No. 4 and Vol. 29 No. 4.
2. Wireless World,* Mar. 12, 1930.
3. Popular Wireless,* Nov. 3, 1928.
4. Wireless World,* Aug. 21, 1929.
5. Wireless World,* Apr. 1, 1931.
6. Wireless World,* Nov. 3, 1926.

* British publication.



2H3N, side view.



Schematic diagram, 2H3N

SUBSTITUTING FOR LOEWE TUBES

The March-April issue of the German "Funk Geschichte" ("Radio History"), carries an article by Bolko Hartmann on making a substitute for the 3NF tube. His approach is to assemble three subminiature 1.25-V triodes, with resistors and capacitors, in a Plexglas case. He used the DC70 tube, equivalent to the 6375 that Amperex once distributed in this country.

Filling in for unobtainable 3NFs might be a good use for Compactron triple-triodes like the 6C10, 6D10, 6K11, 6U10, etc., again with external resistors and capacitors. The added parts could be painted black and potted in clear epoxy on a Loewe base or, for new construction, on an American six-pin base. -LAS

AMATEUR RADIO

EDITED BY
JOHN WARD, KE2ST
Box 7, E. Bloomfield, NY 14443
All correspondence requires SASE for reply.

THE 1991 OLD-TIME CW CONTEST

Congratulations to Marshall Etter, W2ER, who collared first place for the second consecutive year. His tried-and-true formula of "9 watts - 90 watts," plus nearly 27 hours of skillful operating, paid off with 145 confirmed QSOs. Not one to rest on his laurels, Marshall says he hopes to make some W6 contacts on 160 next year. Our second-place winner is Ralph Thomas, W2UK, with 141 contacts confirmed. Third place goes to Sheldon Wheaton, KC0CW, who missed Wednesday night, but made up for lost time in fine style. Special congratulations go to George Batterson, W2GB, one of AWA's charter members and at 90 the oldest operator (!) in this year's event. His beautiful "fist" was music to the ear. Statistics:

TOP TEN PLACES

Call	Score	QSOs
W2ER	1950	145
W2UK	1518	141
KC0CW	1359	90
W2VDI	1332	97
VE3CLX	1296	91
W2LYH	1164	85
K2OA	1044	85
W6AD	1008	60
W2KFG	982	79
K6DIA	954	70

Total contestants: 120; **logs submitted**: 107
Oldest transmitter: W2VDI (1922)
Lowest power: W2VDI (1 watt on 80 m.)
Highest power: WB9K (1 kW on 20 m.)
New stations: 18 - Welcome aboard!

71 stations used an OT TX on at least one band. 32 operated below 10 watts; 24 ran QRP throughout. Conditions were generally good; most 9-watt stations had little difficulty making contacts. Fran Emrich, W2VDI, made 20 QSOs with a WD-11 at 1 watt before the little bottle gave out. He was then forced to QRO to 9 W! 160 meters was ND for most of the second period, due to a 'phone contest. We try, but it's hard to find a no-big-contest weekend these days. Noting the relaxed atmosphere of the event, N2EZ sez the old saying "20 moves plenty" still holds. J37XC had QRM from South American stations "Cuz" reports that Grenada's power company was up to their usual standards, providing anywhere between 220 volts (normal) and 150, with 3 outages on Sunday totaling 3 hours. The low voltage dropped his rig's power supply out of regulation, adding hum to the note. Relying on nobody else's volts, W6TXR ran his 6L6 TX and 2-tube regen RX entirely on batteries. During the second session VE3HIE ran his QRP station from a car battery, and used oil lamps for lighting. K2RY loves to see the 866s flashing in a dimly lit room. We're with you, Jack; silicon diodes may be more reliable, but they're no fun to watch. WI3U apologizes for his MOD rig: "Unfortunately I didn't whoop and chirp"! K2WW/7 sent in some statistics collected over the last few years. Chuck's figures suggest that, despite fewer West Coast participants, a greater percentage of them are building OT stations, while many W1s and W2s are still MOD-MOD. This year's stats confirm the trend, although its significance is unclear . . .

As always, Murphy scored a few points: A long-dormant factory wiring error in W7JY's Millen VFO finally emerged in a cloud of smoke. NW0O had 1 QSO on Wednesday night, got inspired, and worked until Sunday PM building a 47-210 breadboard. After 1 QSO, the 47's filament expired, and Chip had no spare. One of N4QNX's BC-348s suffered PS troubles, and KE2ST troubleshot his HRO for 15 minutes before realizing his antenna relay had welded itself in "TX" position. W1KSK's favorite 7-MHz crystal became balky and had to to be dismounted and cleaned, and his TX lost a bypass capacitor. Here in the Northeast, the recently upgraded Newington Robot (W1AW) is S9++ and some ops found it was too much signal for their regen sets. W1AW has also QSYed to 3581.5, crowding the bottom of the "traditional" AWA window, while on 40 m, they are now at 7047.5. While this caused some inconvenience, some of us with drifting receivers found it to be a useful reference point. K8VBL suggests adding a score multiplier for regen RXs. Others complained that the scoring system is already too complicated, and some had trouble keeping track of the arithmetic. K2IC sez, "The real fun of this event is meeting with old friends, and to heck with the score!" This writer feels that the present system is pretty equitable, but if someone can suggest a streamlined method, I'd love to hear it. Many letters and cards were received with the logs, containing words of encouragement and the unanimous feeling that the contest is a whole lot of fun. Also, a special "thank you" is extended to Ken Gardner, W2BGN, for his 20 years' hard labor as chairman. Without your work, Ken, this event would not be what it is today, and we all appreciate it. *73 de KE2ST.*

SUMMARY OF 1991 SCORES BY ZONE

EASTERN

	SCORE	TRANSMITTER	RECEIVER
W1BPI	22	MOD	MOD
W1BVL	22	MOD	MOD
W1DX	33	MOD	MOD
W1KSK	801	'37 6L6, 25W	'37 HRO
W1MCG	84	MOD	'32 Comet Pro
W1NV	309	'29 Hartley, 5W; '39 HB	'34 3-t TRF; '39 3-t super
W1SZJ	480	'36 6V6-6L6	MOD
KB1UV	135	MOD 38W	MOD
NV1X	282	MOD	'38 RME-69
W1YJ	258	HB, Oct '32 QST	'35 Hammarlund SP-110
W2AAU	258	'39 HB 10W; MOD	MOD
W2AN	882	'37 6L6-807	'39 HQ-120X
K2ANC	105	MOD	MOD
W2BGN	174	'30 205D-205D-211D	MOD
AA2CU	112	'37 Tri-Tet 42, 9W	MOD
W2DTF	45	MOD	MOD
N2EEC	280	MOD 6L6, 8W, 6AQ5 6W	'39 Sky Champion
W2EG	189	'37 6L6-807	'37 HRO
W2ER	1950	'36 Gross replica	'38 RCA
N2EXL	63	MOD, 40W	MOD
N2EZ	72	'30 210 Hartley, 9W	'37 HRO
W2FCH	177	MOD	MOD
N2FCZ	279	'41 HB 9W	'41 NC-200
W2FYU	44	MOD	MOD
K2GBR	33	MOD	MOD
W2HBE	549	'37 42 xtal, 20W	'33 57 Regen - 56 AF
K2IC	80	MOD	MOD
W2IXH	522	'39 6V6-807	'35 Hammarlund SP-200
W2KFG	982	'36 6A6-6A6 9W	'36 3-t superhet
N2KQE	3	MOD	MOD
W2KTU	504	'37 HB, 9W	MOD
W2LL	28	MOD	MOD
K2LP	722	'39 HB,150W	'38 HQ-120
W2LQR	2	MOD	MOD
W2LV	62	MOD	MOD
W2LYH	1164	'36 HB, 9W	'36 HB superhet
WB2MVK	888	'39 HB, 9W	'40 HB superhet
KE2O	84	'39 Signal Shifter, 9W	'35 SW-3
K2OA	1044	'38 6L6 xtal, 8W	'38 HQ-120
KE2PR	38	MOD	MOD
AI2Q	384	'39 6L6 xtal, 8W	MOD
W2RFY	16	MOD	MOD
W2RUK	4	MOD	MOD
K2RY	324	'36 47-46-210, 30W	'36 HRO
KE2ST	390	'29 TNT, 9W; '40 Stancor	'41 HRO
W2UK	1518	'37 RCA HCT-40; MOD	'37 HRO
W2VDI	1332	'22 WD-11; '32 & '35 9W	'38 HQ120X
W2VVC	97	MOD	MOD
N3AYU	441	'32 203 Hartley, 60W	'34 SW3
KA3BRK	249	'41 6V6-6L6 8W; MOD	'41 Hall. S-22R; MOD
W3BYM	387	'36 6L6-par. 6L6s; MOD	'39 Hallicrafters SX-24
W3DB	192	'29 Hartley, 20W	MOD
W3EAN	120	'40 BC-696	'40 Skyrider Defiant
W3HWT	444	'24 202, 9W; '26 210 9W	'24 1BGF; '26 CR-18
W3INV	207	'36 2A5-10Y, 40W	'33 HB (QST Oct. '33)
W3OER	706	'29 TNT, 1.5W; '39 HB 9W	'29 Pilot; '39 HQ-120
W3RG	30	MOD	MOD
WI3U	106	MOD	MOD
AF3V	63	MOD	MOD
W3VVS	708	'39 Signal Shifter, 9W	'38 HQ-120
W4BIW	456	MOD	'36 NC-100X
W4CBG	87	'39 Meissner 9W; MOD	'36 NC-100X

EASTERN, CONT.

	SCORE	TRANSMITTER	RECEIVER
N4EE	329	'38 59-801, 30W; MOD	'38 HQ-120; MOD
N4FS	228	'39 Signal Shifter, 9W	'41 Navy RBB
W4OTN	126	'39 HB, 20W	'37 HQ-120
N4QNX	63	'37 Thordarson	'38 BC-348
AA4RM	828	'41 Stancor 69	'36 RME-69
W4VBX	726	'38 6J7-6K7-6L6; MOD	'36 HRO
W8AQ	46	MOD	MOD
W8CZR	51	MOD	MOD
KA8DKT	18	MOD, 50W	MOD
K8KK	156	'39 6L6 xtal, 8W	'36 Iron Sarge (OTB 30-2)
WD8OFB	84	'33 210 xtal, 9W	'33 FB-7
K8VBL	390	'33 42 xtal/par. 42s	'38 NC-101X
W8VSK	164	MOD	'39 RME-69
W9GJS	36	'35 HB MOPA, 50W	MOD
WB9K	600	33; '37 HB; '39 9W; MOD	'38 NC-101; '37 HRO; MOD
W9POC	534	'38 6F6-6L6 20W; MOD	'40 SX-28; MOD
N9TT	94	39 BC-375; MOD	'37 BC-312
VE3BHW	32	'37 6C5-6F6, 5W	MOD
VE3CLX	1296	'39 HB, 9W	'41 HRO
VE3HIE	72	MOD 5W	MOD

WESTERN

	SCORE	TRANSMITTER	RECEIVER
K5CF	195	'40 6J5-6L6, 15W; MOD	'40 RME-70/DB-20; MOD
W5DPM	81	'38 National NTX-30	'36 NC-101X
WA5VLZ	184	'41 Meissner 9W; MOD	'36 HRO
W6AD	1008	'35 47-46-T55, 60W	'33 Comet Pro
K6DIA	954	'38 T21-35T, 85W	'38 HRO
W6DJX	324	'38 6L6-T20, 9W	'39 HRO
K6ILM	435	'40 6L6, 9W/35W	'34 FB-7A/PSK
W6TDP	360	'38 6L6-809, 50W	'39 Hallicrafters S-19R
K6TQ	315	'38 6L6-807	'36 HRO
W6TXR	72	'40 6L6 xtal, 9W	'40 6F8/6C5 Regen

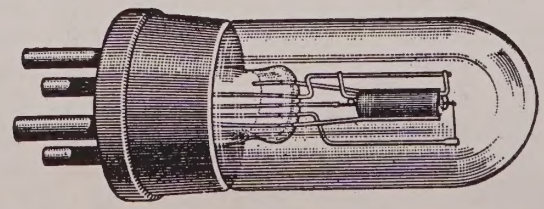
WESTERN, CONT.

	SCORE	TRANSMITTER	RECEIVER
W7BCT	12	MOD	MOD
W7JY	9	'39 59/2-46, 30W	'35 National SW-3
W7LOG	48	'38 6V6-807; MOD	'38 HQ-120X
W7OD	22	MOD	MOD
W7SEH	180	'39 6V6-807, 30W	'36 HRO Jr.
K2WW/7	160	MOD	MOD
K7YIR	441	'39 Hallicrafters HT-9	'38 HQ-120
KC0CW	1359	'39 6L6-809	'35 HRO
W0FXY	123	MOD	MOD
KI0G	96	'35 VXO-210, 5W	'39 HQ-120
W0JF	60	'27 210-203; MOD	MOD
NM0L	240	'38 Hallicrafters HT-6	MOD
NW0O	10	'34 47-210	MOD
W0OG	477	'39 Hallicrafters HT-9	'39 Hallicrafters SX-24

DX

	SCORE	TRANSMITTER	RECEIVER
J37XC	840	MOD, 90W	'35 3-t TRF; MOD

Stations not submitting logs: W1YG, W2FW, W2GB, K2MP, W5KL, KB0TG, W2ADB, W2BCH, WA2DAC, NA4G, WA2JYO, W2BVR, W7AHK



Famous transmitting (?) tube, the WD-11.

THE MAILBAG

Readers' comments on early radio topics are welcome. Because of space limitations, letters that are published may have to be edited. Send all material to the Editor.

CHEAP CAPACITORS

I would suggest a source of rugged high-quality capacitors: removed from old 220-V room air conditioners junked at a local scrap yard. If physical size is not a problem, they are almost indestructable electrically and physically, sealed in steel cans. Rated around 450 V working voltage, they will probably peak on DC higher. Capacities run lower, maybe 35 μF or less, but so did the old radio power-supply filters before electrolytics.

A word of caution on safety. Some of these capacitors have a discharge resistor soldered across their terminals and will discharge, but beware of those that do not, because they can give you a hazardous shock after lying idle for days or weeks. Us old timers got to be careful, you know! **Paul D. Nevatt**

DO-IT-YOURSELF TV

Your article in the February OTB [Rodney Schrock's "Scratch Built TV"] did take me back a bit as well as keeping me where I am: I did the same thing back in 1954. Took parts, mostly from a secondhand hot-chassis set which used five 25Z6 rectifiers. It worked too, and among other things taught me that different makes of 5V4 rectifier tubes connect the cathode lead to different heater pins. This makes a difference when you use a 5V4 as a damper diode. I still have this set and it would probably still work, with due caution to the electrolytic filter condensers.

Instead, I decided a bit later to get a genuine factory-built Westinghouse set, complete with a big power transformer, on sale for "a dollar per inch." After laying out 10 big bucks for this, Sams Set 76, Folder 11, of 11/49, had to do for all TVs. Since then, this set has been worked on right much and all of the 0.01 μF bypass condensers have been replaced.

This year I've become tired of the timed-demise, throw-it-away consumer stuff you get these days and have undertaken to revive the Westinghouse set. This involves mainly taking out some of the improvements of past years. Also, a few transistors judiciously placed do wonders for these old sets. Maybe no one will notice.

One thing about these old TVs is that a 70-year-old senior citizen can see them well enough to work on them. Also, by now we may be smart enough to spot the silly mistakes we put into them 10 or 15 years ago. The old tubes work for at least 10 years if you use 5-6 volts on the heaters and can always be replaced with ICs if necessary. One new feature of this set is a 15-volt power supply from the filament windings for purposes such as this. So, I look forward to sometime watching reruns of the old B & W programs on a genuine B & W TV. Seems fitting somehow. **Doc, W4OFV**

SHIPPING TUBES

Regarding your comments and questions about shipping tubes. You must always use shock-absorbing material to protect tubes (and any other fragile items) from damage is shipping and handling. Foam "peanuts," shredded paper, lightly crumpled newspaper, spongy foam (not the hard, slick blocks), bubble plastic, and similar materials are suitable. There should be a MINIMUM of three to four inches of the material between the tubes (whether in cartons or not) and the shipping carton. Cartons get thrown around, dropped, etc., quite a bit during shipping and there must be something between the carton and the merchandise to absorb the resultant force so that it is not transmitted to that merchandise; otherwise, damage is very likely to occur. **William H. Bauer, W4NZY**

THE ATB TRANSMITTER

Possibly we could ask the membership to provide serial numbers on the ATB transmitters in their possession.

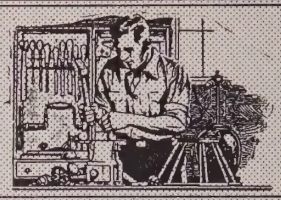
My ATB is serial number I-4134 (note the use of I-). Instruction book I have is serial number 9293. Did the instruction book serial numbers match the transmitter's serial number? **August J. Link**

HISTORY OF THE BC-191

In regard to the article "Origin of the BC-191/BC-375" by Alan Douglas in the May OTB: I ran across some interesting information in War Department Technical Manual TM 11-800 that might be of some interest to your readers concerning the early history of the BC-191. I find listed a BC-AA-191, the predecessor of the BC-191-A. A check of the photographs and schematic of the BC-AA-191 show it to be an evolutionary step between the RT-76-A and BC-191-A. Unlike the BC-191-A and later designs, which had the antenna tuning unit, the antenna switching relay, the power-control and the keying circuits mounted internally, the BC-AA-191 and RT-76-A required external units to provide these functions, i. e. the BC-AA-194, BC-AA-193 and BC-AA-204 antenna tuning units, antenna switching relay BC-AA-196 (the RT-76-A had the antenna switching relay), and radio control box BC-AA-192.

I enjoyed Mr. Douglas' article, let's hear more from him and others on communications equipment of the 1930s. **Philip McCoy**

EQUIPMENT RESTORATION



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All correspondence requires SASE for reply

REMOVING MOLD AND MILDEW FROM WOOD CABINETS

Ross Smith
1133 Strong Ave., Elkhart, IN 46514
Courtesy *IHRS Bulletin*

You found a "musty smelling" radio in a damp basement? *Don't throw it away!* With time and patience it can be deodorized. Suggested steps for the process are as follows.

1. Remove the chassis, speaker and loop antenna from the cabinet. Philco loops of heavy copper wire attached to the cabinet may be disconnected and left in place.

2. Give the inside wood a good bath using Top Job detergent full-strength. Scrub stains with a brush, rinse in hot water and quickly wipe dry.

3. Clean the outside wood, vinyl or canvas covering with one part Top Job and two parts water by volume. (Concentrated detergent may act as a stripper and damage the finish or remove labels.) Rinse, wipe dry and expose the cabinet to direct sunlight for several days. On a rainy day, use a sun lamp (*not* a heat lamp). I use an ultra-violet lamp that emits "cold light" from a neon-type tube.

4. When they are dry from the cleaning, spray the wood surfaces with Lysol disinfectant. Spray twice a day and continue the sun treatment for as many days as necessary. Difficult cases usually take seven to ten days.

5. When the musty smell subsides, apply mineral spirits with a brush to all wood surfaces twice a day and continue exposure to the sun. Two days of this step is usually enough.

6. When the odor is gone, seal inside wood surfaces with a heavy varnish, such as marine spar varnish, and finish the outside as needed. (For finishing suggestions, see "Dark Brown Stain" in the OTB, Aug. 1990, p. 14.) For vinyl- or canvas-covered cabinets on portables, spray the outside with one or two coats of clear acrylic enamel.

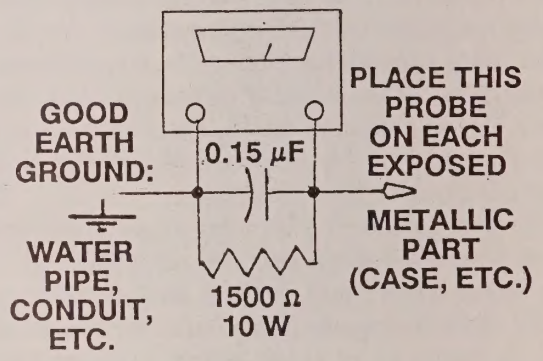
The key to a successful clean-up is long exposure to the sun or ultra-violet rays. Sealing the wood afterwards should prevent the odor from returning. I have had good luck in cleaning up both console and table cabinets with this procedure. In extreme cases, the chassis will also need to be cleaned and exposed to the sun for at least two days, using the Lysol spray on top and bottom and on cotton-covered wiring.

A SAFETY TEST

Tom Rosica, W2GIR
125 Grandview Terrace, Batavia, NY 14020

How many times have you worked on a piece of electrical equipment and received an uncomfortable shock? After further checks, you may have realized it was "normal" AC leakage to ground, which sometimes must be tolerated, for example, with line-bypass capacitors.

Have you ever wondered how much leakage is acceptable - where do you draw the line - how can you make such a measurement - simply? Well, the Consumer Electronics Group of the Electronic Industries Association (EIA) has a guideline to be used by the radio-TV servicer as a reminder of his obligation always to deliver a safe radio or television set. You should always be conscious of the safety aspects of each job, and never be tempted to slight any of them. The test reads as follows.



AC LEAKAGE TEST

Do not use an isolation transformer during this test. Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner: connect a 1500-Ω, 10-watt resistor paralleled by a 0.15 µF AC-type capacitor between a known good earth ground (water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination 1500-Ω and 0.15 µF capacitor. Reverse the AC plug and repeat the AC voltage measurements for each exposed metallic part. For receivers manufactured prior to 1973, the voltage may measure as much as 7.5 RMS. (This corresponds to 5 mA AC.) Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately. For receivers manufactured after January 1, 1973, the voltage must not exceed 0.75 V RMS (corresponding to 0.5 mA). Any value

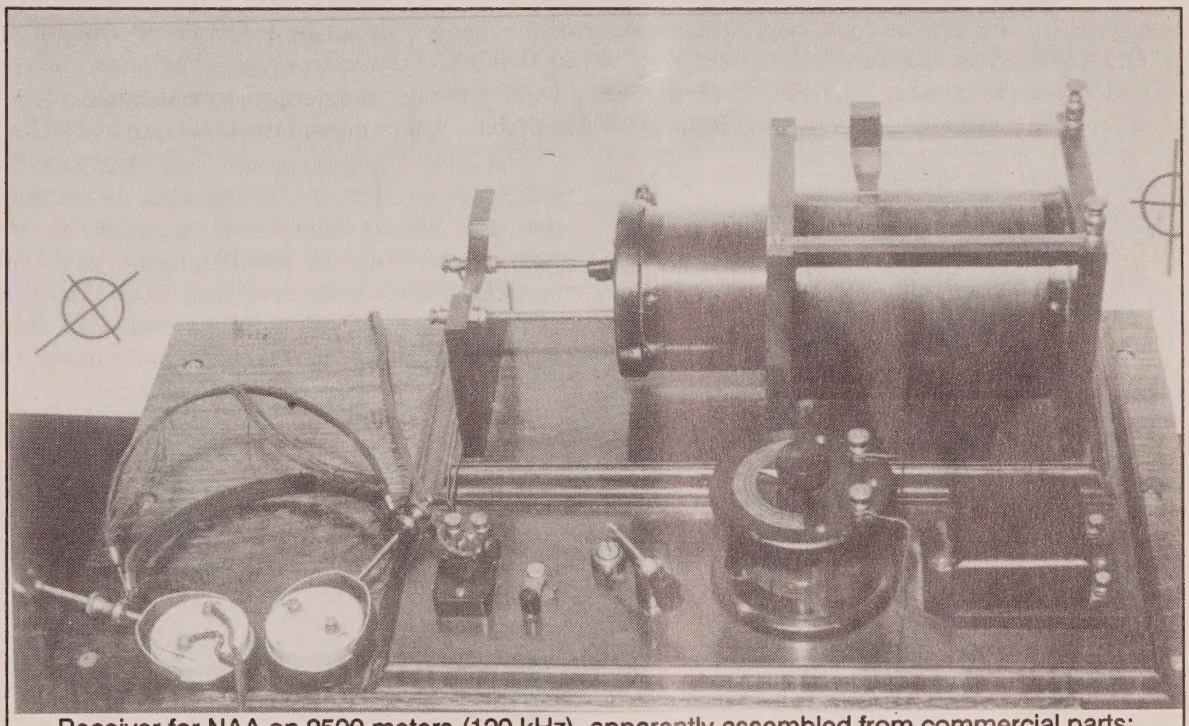
THE BOWMAN TECHNICAL SCHOOL

Alton A. DuBois, Jr.
RD6, Box 180E, Queensbury, NY 12804

The Bowman Technical School in Lancaster, Pennsylvania, was founded in the late 1800s by Ezra Bowman, watchmaker, to train young men and women as watch and clock makers. It is still an accredited watch and clock school today.

In 1914 Chris M. Bowman, son of Ezra, made approximately 60 "crystal sets" to sell to jewelers to use in receiving time signals from the Navy station at Arlington, Virginia. One of the receivers is now in the possession of the National Association of Watch and Clock Collectors in Columbia, Pennsylvania. The NAWCC is an international organization of collectors, makers and historians interested in timepieces. It maintains a public museum in Columbia, approximately 15 miles south of Harrisburg on the Susquehanna River.

The information above was obtained with permission of the NAWCC from its publication "225 Years of Timepieces, A Lancaster County Legacy," published in 1979.



Receiver for NAA on 2500 meters (120 kHz), apparently assembled from commercial parts: Chambers loose coupler, Murdock variable capacitor, Brandes Superior phones.

(Continued from p. 32)

exceeding this limit constitutes a potential shockhazard and must be corrected immediately. For receivers manufactured after January 1, 1973, the voltage must not exceed 0.75 V RMS (corresponding to 0.5 mA). Any value exceeding this limit must be corrected immediately as a defect is indicated which may lead to potential a shock hazard.

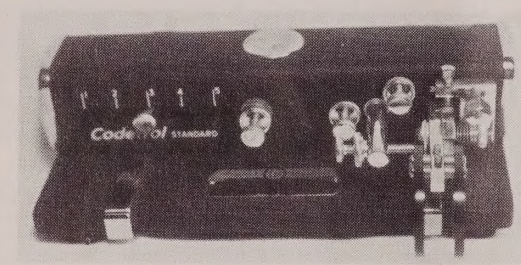
Many manufacturers include this safety check in service publications. As amateurs and restorers, we often have contact with gear that should pass the above test. If the leakage is too high, we should look deeper into the cause and find a remedy. For extra protection, we should always test all equipment, either with the conventional three-wire cord, or a separate ground wire - to insure against any possible shock hazard.

[This is an AC test; it cannot catch the case where a field-coil speaker has a leakage that puts DC voltage (B+) on the frame, and thus on the mounting screws that protrude through the front of the radio. No problem: just switch the meter to DC volts. Many conscientious restorers add a wire to ground such speaker frames to the chassis.

There is a special danger in old oscilloscopes with two-wire power cords. If the insulation in the power transformer breaks down between the primary and high-voltage windings, the case of the instrument can be "hot" by a kilovolt or more. A friend of mine found this out: on a '60s-vintage kit 'scope, he got between the case and ground. He got a violent, can't-let-go shock. What saved the day was the ground-fault interrupter on his workbench: it eventually tripped off. The lessons are clear: upgrade those 'scopes to three-wire power cords, and spend $20 on a GFI. -LAS]

KEY and TELEGRAPH

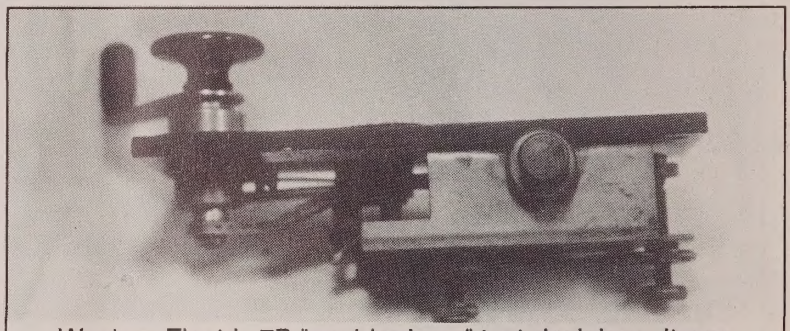
EDITED BY
LOU MOREAU
W3WRE



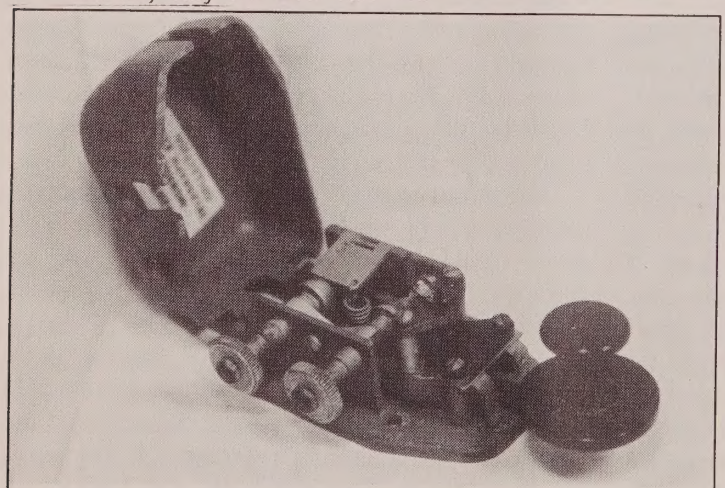
The excellent Codetrol semiautomatic, invented by Bernard Breedlove, appeared in 1951. But because of the rise of electronic keys, it never got off the ground.

Q: I would like to know how and where to find old-time references to the construction of keys you have mentioned in the OTB.

A: There are very few, and they will require a lot of reading, but here goes. First, no one has tried to describe the keys that were used, but they can be found in engravings in some of the early histories of the telegraph. Here the most important are: George Priest, History, Theory, and Practice of the Electric Telegraph (1860); Taliaferro P. Shaffner, The Telegraph Manual (1858); Thomas D. Lockwood, Electricity, Magnetism, and Electric Telegraphy (1883); William Maver, Jr., American Telegraphy and Encyclopaedia of the Telegraph (1912). But you must be careful. For example, Priest has a number of editions; only the first and the third are important in the key story. Lockwood is very well illustrated, while Maver has a better detailed text. Shaffner is an excellent work; while your local library may not have it, it and the other three are easily available through Interlibrary Loan. All one needs to do is request the library to ask for these works. There are far too many others to mention here, so I suggest you check Alvin Harlow's Old Wires and New Waves (1936), which has an excellent bibliography listing works that are not usually found in more modern references. Thus, by checking these works the material I have cited will appear, but it takes a lot of reading. Also, you will find invaluable references in the U. S. Patent Indexes that are published yearly by the Patent Office and are also available through Interlibrary Loan. Each type of telegraph instrument is listed in alphabetic order up through 1920 under the type, such as keys or sounders. After 1920 they are no longer listed that way and it is necessary to find them by the inventor's name.



Western Electric 7B "upside down" test-desk key. It was mounted below the desk (e. g., the 17C toll testboard) with the knob extending above the surface.



Key found in a wrecked German tank near Munich in March 1945. *Photos: W3WRE*

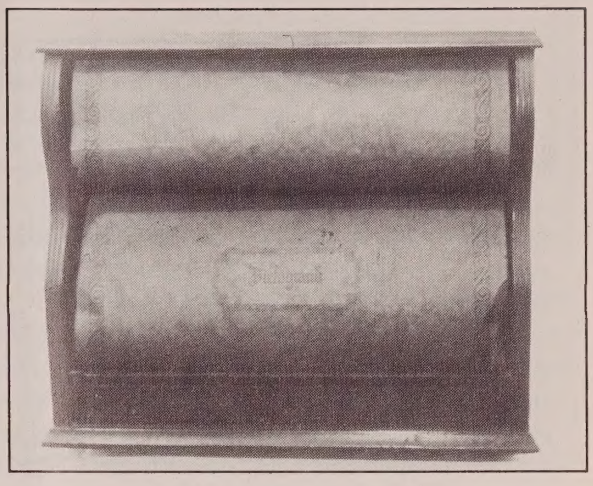
After the Civil War the manufacturers of telegraph instruments began advertising and issuing catalogs. If you want to do a lot of research there are lots of lists that are "as available as your desire to spend the time locating them." For more modern advertising, check back issues of QST for announcements of new products. Lots of luck.

DICTOGRAND "ROLL" SPEAKER

David W. Kraeuter
506 E. Wheeling Street, Washington, PA 15301

This Dictogrand speaker is easily mistaken for a kitchen paper-towel dispenser! It has no speaker cone, but it does have two paper cylinders which work just as well. A screw adjustment in back varies clarity and volume. Date unknown.

Photo: Todd Yeager



THE BC-655

Harry Mills, K4HU
631 4th Avenue, West, Hendersonville, NC 28739

A recently acquired piece of surplus Army Signal Corps equipment may be of interest to collectors. It is a "Target Transmitter BC-655-A," made by Bendix Radio in Baltimore.

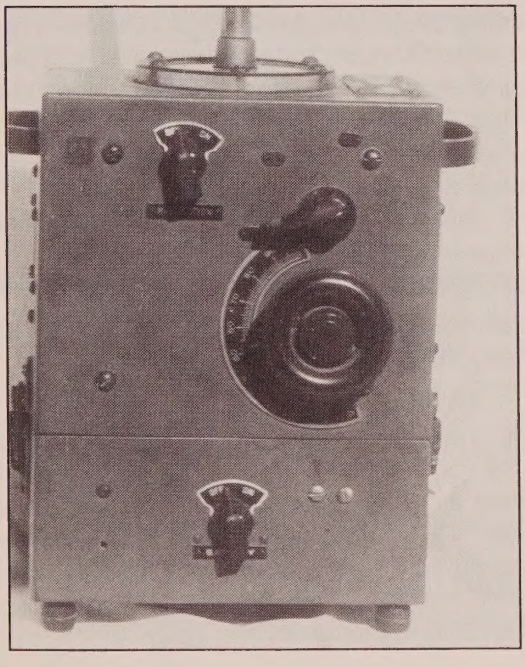
The equipment is housed in a case measuring 6" X 7" X 5.5", attached to a battery case 3" X 7" X 5.5". An antenna extending to 27" is mounted on the top surface.

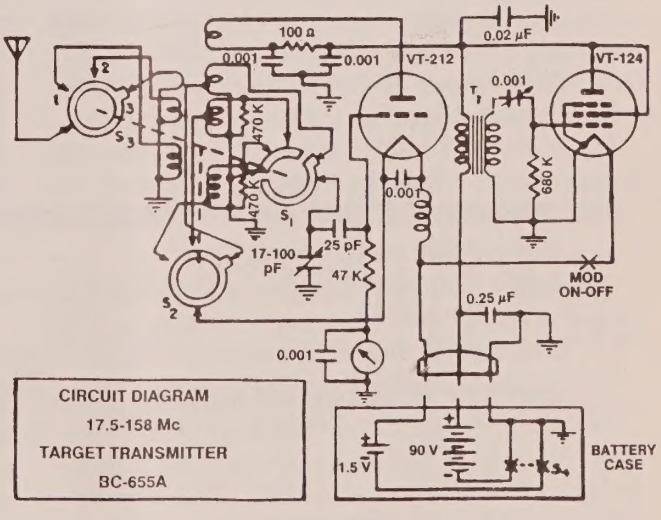
The front panel contains a range switch, tuning control, and modulation on-off switch, with a power switch on the battery case. On the rear is a frequency calibration chart showing the three ranges, 17.5 to 36, 34 to 76, and 75 to 160 MHz. On the left side is a 200-μA meter which indicates grid current in the oscillator circuit. On the right side is the schematic showing the circuit, which employs a VT-212 triode (958) and the audio oscillator - Heising modulator using a triode-connected VT-124 (1A5GT).

The bottom of the battery case has a large circular threaded receptacle intended for mounting the assembly on a support, probably a tripod.

The equipment emits a very respectable signal covering the 18-, 21-, 24-, 28-, 50- and 144-MHz amateur bands. While the calibration is not precise, it serves well to find the band of interest and should prove useful in antenna work.

[Reference material researched by AWA member Frederick Chesson shows the BC-655 as being part of the RC-93 test equipment. It was used with the SCR-555 18-65 MHz direction finder and the SCR-575 mobile 100-156 MHz forward direction-finding station, which was used for fighter direction. -LAS]





TUBES IN THE R1155 RECEIVER

Philip Taylor
14 Willow Walk, Canewdon, Rochford, Essex SS4 3QH, England

The RAF R1155 receiver [OTB, February , p. 11; May, p. 24] appears to be the only piece of equipment to use the BL63, KTW62, MHLD6, and X66 tubes. The other "classic" Marconi receivers from WW II, the CR100 and CR150, both used glass octals from the normal domestic range made by Marconi-Osram Valve (MOV), except that the CR150 used EF50s as well. The two postwar marine receivers from Marconi Marine, the Mercury and the Electra, also used standard glass octals - X61, KTW61, etc. The following notes may be useful to owners of the R1155 wishing to get one going.

VR99 (later CV1099; stores ref. 10E/1277; commercial X66]. May be based on the MOV X65, the first octal-based triode-hexode marketed by MOV around 1938. It does not appear to be based on any U. S. tube, unlike the rest of the MOV octals first marketed in 1937. No direct electrical equivalent, but the 6K8G will no doubt work. Check screen, oscillator anode, and cathode bias voltages.

VR99A: A wartime substitute: it is the Mullard ECH35, less sprayed-metal coating. The ECH35 had a higher conversion conductance and is very similar to the X61 from MOV, which appeared about 1940. The X61 is usually supplied metal-sprayed (X61M) and should not be used in the 1155 unless the coating is scraped off.

VR100 (later CV1100; stores ref. 10E/278; commercial KTW62]. May be based on the KTW61, a beam-tetrode RF voltage amplifier available from MOV by 1939. No direct equivalent apart from the KTW61. Similar valves 6K7G (lower g_m) and EF39. The KTW61 and EF39 were supplied metal-sprayed, so check for wires on pin 1 on the tube socket.

VR101 (later CV1101; stores ref. 10E/280; commercial MHLD6). The number does not follow the 1937 MOV system for octal valves and may well be a special made for the 1155. No known equivalent. The 6R7G or MOV DL63 might be used, but for maximum gain, anode load and grid-bias values should be checked and altered if necessary.

VR102 (later CV1102; stores ref. 10E/279; commercial BL63). A double triode based on the BL62, which was available briefly in 1939 for TV sets and appears to have very similar characteristics. No direct equivalent, but as this tube is used in the DF section of the 1155, it need not be replaced.

VI103 (later CV1103; stores ref. 10E/305; commercial Y63). Tuning indicator with direct equivalents Y61 (tubular bulb), Cossor 63ME and Brimar 6U5G. The same electrically as the 6U5/6G5 but with an octal base.

OTB readers might like a translation of the MOV numbering system for octal tubes:

X: Frequency changer. Can be a triode-hexode such as X65 or X66, or a heptode like X63/6A8G.

KTW: Kinkless tetrode, variable μ, for voltage amplification.

BL: Double triode.

First number: 6 indicates heater voltage.

Second number: a series or development number. In the KTW series there were three: KTW61, KTW62 and KTW63.

The MHLD6 was a return to the number system devised ca. 1929 for mains-powered tubes: M - mains powered; HL - medium-impedance triode (between H for high, and L for low); D - diode(s); 6 - heater voltage.

For availability, all are around still but such specials as the MHLD6 are getting expensive. I have a good stock of genuine KTW62 and a few VR99A/ECH35. As time wore on and original Air Force surplus started to dry up, re-numbering became the thing with some valve shops, and there are a good many 6K7Gs around renumbered KTW61 and KTW62.

AWA 2-METER NET

Members in the Rochester area are invited to check in on the AWA Net every Monday at 7:30 PM. Receive: 146.820 MHz; transmit: 146.220.

LIBRARY OPEN TO MEMBERS

The AWA Annex Library will be open to members from 2 to 5 PM on Sundays for the season, for example on August 11 and 25. This is an opportunity to see the new facility, research material, and check schematics. A Xerox copier is available for copying material. To use the library, go first to the Museum.

RADIO CLASSES AT MUSEUM

The radio classes sponsored by the Museum and SIARC (Squaw Island Amateur Radio Club) have resulted in 15 new amateurs passing their examinations. Congratulations! Credit for this accomplishment goes to Tom Socci, W2RUK; and Rich Parsons, N2LQF. AWA has three VECs locally: K2MP, K2GBR, and WM3D. [BK]

ZENITH PRODUCT CODE SINCE 1949

Dave Zimmerman
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In this article I hope to provide information on identifying Zenith receivers from 1949 until the demise of tube-type designs about 1968. This supplements the information in "Hints on Identifying Broadcast Receivers" in the February 1990 OTB, p. 15. That article lists data on prewar Zenith sets, derived from Volume III of the Zenith Service Manual, as supplied by member Arie Breed. Information on postwar sets was based on Sams' Photofacts. This is a very complete list of alphanumeric designations for Zenith radios up to 1949, such that virtually any receiver of the period can be identified.

In 1949 there was a radical change in the model-numbering scheme. Whereas the previous system had given information on operating voltage, bands, battery/farm use, etc., via a letter code, such data are no longer directly available.

First of all, each receiver manufactured after 1949 has a model number and a chassis number. A single chassis number may be common to several models. There is a letter designator within both model and chassis numbers which is associated with a particular design/production period (approximately a year long). The letter is the same in both the chassis number and the model number unless the model is of a later design period than its chassis. Evidently, a new separate chassis numbering scheme had gone into effect several years before, and remained after the model-number change. Below is a list, by approximate year, of design/production period letters used in model and chassis numbers.

DESIGN/PRODUCTION LETTERS

1949	E, F	1956	X, Y, Z	1963	K
50	F, G	57	Z, A	64	L
51	H	58	B	65	M, N
52	H, J	59	B, C, D	66	N, T, X
53	J, K	60	C, D, E, G	67	N, T, X
54	L, R	61	F, G, H	68	T, Y, Z
55	R, T	62	H, J		

Keeping in mind that the above list is based on Sams' publication dates and dates found printed on receivers, the list should be used only for placement within about a year. As examples, a list of "615" receivers (AM broadcast, six-tube with tuned RF stage, AC-DC) made over several periods is shown below.

Model	Chassis	Model	Chassis
G615	6G05	K615	6K05
H615	6G05	Z615	6Z05
H615Z1	6G05Z1	A615	6Z05
J615	6J05		

Note that only certain letters are associated with "615" models. The "6" in both model and chassis numbers is the tube count.

To illustrate how receivers were differentiated within a design/production period, the following list shows several seven-tube radios made during the first "H" period, 1951-52.

Model	Chas.	Description
H723	7H04	Basic AM/FM bakelite table radio.
H724	7H02	H723 w/ tone, handle, & pilot light.
H725	7H01	Larger AM/FM bakelite with tuned RF stage and 7.5" speaker.

This example illustrates several aspects which are fairly consistent from year to year: (1) Model numbers increase with performance level and options; (2) A model number is usually paired with the same chassis number during all of its design periods (i. e., "723" models use "04" chassis, "724" models use "02" chassis, etc.). Admittedly, this can be confusing until you get used to the receivers themselves. The formats which were used are represented symbolically as follows.

Model Number. The model number has the following form: *LNmm(ww)*, where "L" is the design period letter, "N" is the tube count and "*mm*" is the actual type number within the realm of n-tubes models. Together the "*nmm*" relates to a certain level of nominal performance that existed in numerous design periods and usually is higher for better receivers. If there is a "*ww*," it can mean either a modification or a cabinet style or color, depending on its form.

Chassis Number. The chassis number has the following form: *NLmm(ww)*, where "*N*" is the tube count, "*L*" is the design period letter and "*mm*" relates to the unique characteristics of the chassis with no particular order. If there is a "*ww*," it probably relates to a modification which was not significant enough to require changing the design-period letter.

Perhaps a list of the 1959 line of seven- and eight-tube AM-FM receivers will help clarify.

Model	Chas.	Description
C724G, P, W, L	7C02	Basic AM/FM plastic (in colors), 4" speaker.
C725C, F, L	7C06	Like C724 with AFC, 4" X 6" speaker, gold trim.
C730E, R	7C05	Like C724 but in wood cabinet, tweeter.
C835E, R, H, W	8C01	Wood cabinet, electrostatic tweeter, RF stage.
C845, Y, W, H, L	8C02	Veneer, cone tweeter, tuned RF stage.

As with any numbering system, there are exceptions and inconsistencies which are intriguing and sometimes frustrating. Some exceptions for the period are these:

1. Model 6D815, chassis 6E05 was a 1949 receiver whose model number follows the earlier identification scheme. As stated before, it appears that the chassis scheme discussed in this article was already in place by 1949. Similarly, model 7G810, chassis 7E01 is the same story. Using the later scheme, these sets probably would have had model numbers "E615" and "E725" respectively.

2. Model numbers tend to increase with performance and options, but this is not absolute. H723 has a bigger speaker than C724, and the Transoceanics whose numbers are H500, R600 and T600 do more than H511Y or G615.

3. During the 1960s, there was a repetition of letter designations that had been used about 10 years prior. To prevent duplication, some model-number formats violated the tube-count reference normally found in the model numbers. A typical example was a receiver known as "X334," which had chassis number 7N07 (a seven-tube AM/FM radio from the '60s "N" period).

4. Confusion can also be caused by the reverse of item 3. Model K725, Chassis 7K01 had been a 1953 set which followed the rules nicely. However, there was a K725 with a chassis number 7K06 about 10 years later and then, to make matters worse, K725, Chassis 7K06Z was available circa 1968. Who knows what would have happened if tube receivers had continued after that!

Although there are ample exceptions and inconsistencies, a model number and chassis number can help a lot in placing a receiver as to time and anticipated performance.

(Continued from p. 6)

NEW CLUB - NEW YORK

The newly formed Hudson Valley Antique Radio and Phonograph Society is seeking new members.

The Society's goal is to help its members share their interests with others who have a desire to preserve and enjoy antique radios, phonographs and related items.

The Society is in the process of planning future membership meetings, educational programs and swap meets. For more information, please call John or Linda Gramm at (914) 427-2602, or Geoff or Judy Shepherd at (914) 561-0132. [J. & L. Gramm]

IHRS-AWA KOKOMO MEET

Celebrating the 20th anniversary of the Indiana Historical Radio Society, the IHRS-AWA spring regional meet was held at the Ramada Inn, Kokomo, IN, on May 3-4 with a total registration of 160.

Friday was a good day for the extensive swap meet. Technical sessions were held in the afternoon, with a program and reception in the evening, including old-tyme movies and a slide show on the AWA-BVWS London meets from 1984 and 1989.

The indoor swap meet was more popular on Saturday because of a change in the weather. The auction offered the usual good buys, including a complete collection of battery sets from the 1920s. The old-equipment contest and Saturday evening banquet completed activities of the day. [Ross Smith]

HVRA-AWA CONVENTION AT A GLANCE

This year's convention, April 27-28, represents a milestone in Houston Vintage Radio Association history - every measurable category showed an increase over previous totals: the auction gross and total lots, old-equipment contest, banquet attendance, and hotel rooms. Here are a few comparisons to chew on.

The auction grossed $15,600, almost twice 1990 and 42% above our previous high (1989). Total lots were 537, up 40%. Registration was 113, one less than 1989; 27.4% were from out of town. Putting a pencil to the convention results a little farther reveals additional facts: (1) 47% of the lots sold were purchased by non-Houston residents, representing only 20% of the total buyers. (2) Likewise, out-of-town sellers represented only 14% of all sellers, but sold 53% of the lots. The successful effort by members to provide a quality event platform for area collectors and guests to meet, trade, display old equipment, exchange ideas, etc., needs to continue.

Additonal areas showed an increase, though not as dramatic. Banquet attendance was up by 6%. Old-equipment contest entries were up a fifth over the 1988 high (King's Inn - NASA), and 43% over last year. The number of participants in the contest was one more than last year. Contestants entered an average of 4.2 radios, our highest.

Arrangement at the hotel were modified at the last minute, bringing mixed reviews from members. At last year's convention we had full use of the facility; this year was different. Nevertheless HVRA had a record-breaking year in the midst of adversity (excluding mall shows, which were full of surprises). The hotel was in a real jam. The events booked by the hotel for Saturday evening grew very large at the last minute. At first, we refused to make any change but the hotel was willing to offer concessions that saved HVRA $645. This situation will be negotiated against future occurences. [David Moore]

(Continued on p. 41)

THE GENERAL ELECTRIC M-81

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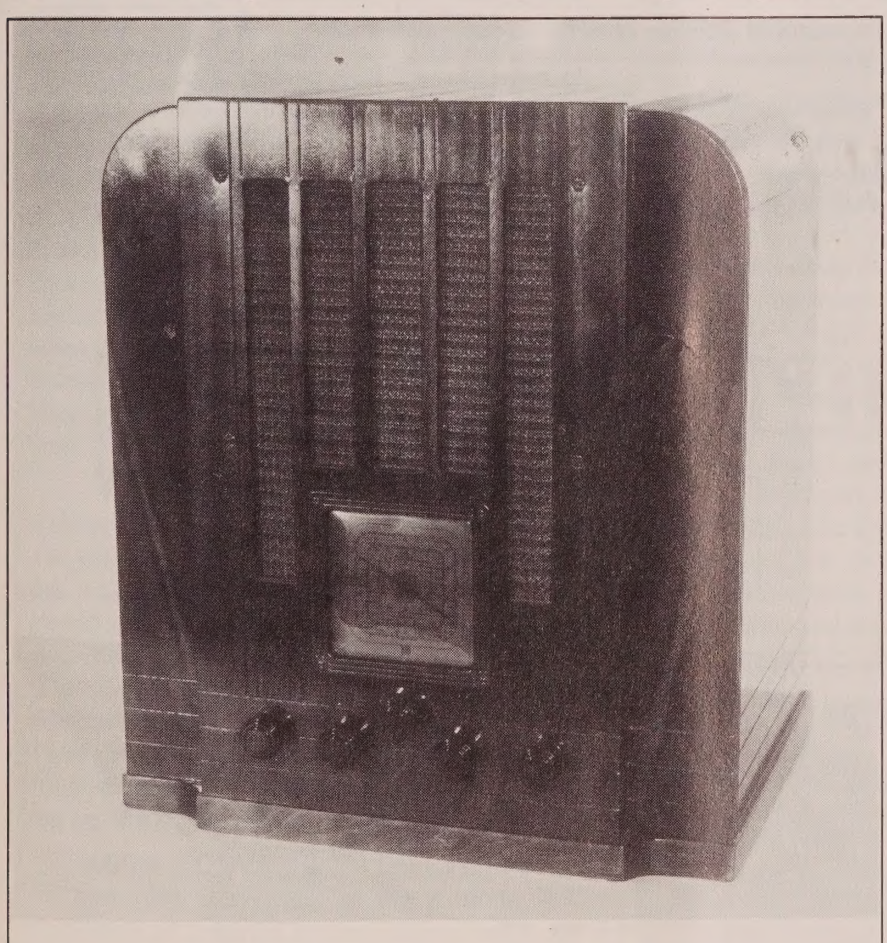
The General Electric model M-81 table radio of 1934 is a large set in every sense of the word. It is 17.5" wide, 13.5" deep and stands 20" high; it weighs 31 pounds. It has eight tubes: a 6D6 tuned RF amplifier; a 6A7 converter; a 6D6 IF; a 75 detector - first audio; and a 76 transformer-coupled to a push-pull 42 output stage which delivers a hefty 10 watts into a 10-inch speaker. The rectifier is a 5Z3.

This receiver was state-of-the-art for the serious BCL and SWL of the time. It has many features not usually found in home sets. It tunes from 135 kHz to 18 MHz in four bands with a gap from 420 to 540 kHz to avoid the intermediate frequency. The 135-420 kHz band is most unusual in a consumer set. A remarkable feature of this set is an RF gain control.

The regular tuning ratio is 10:1, but, by pulling out on the tuning knob, a 54:1 vernier drive is engaged for SW tuning. There is a small "second hand" dial pointer for logging stations on a vernier scale. The band selection shows in a small window on the main dial.

The power transformer primary is fused and tapped for 110 or 125 VAC. The correct voltage is selected by placing the fuse in the appropriate clips. There are several jumpered terminals on the rear of the chassis. The cathode lead of the 6A7 converter is interrupted by a pair of terminals. By replacing the jumper between these terminals with a switch, one can have a "standby" mode. Another set of terminals allows breaking into the grid circuit of the first audio tube so that the set can be used an as AF amplifier. A third set of terminals allows insertion of an internal R-C bass-boost network into the plate circuit of the first audio stage by moving a jumper. The fuse clips and all rear terminals have metal covers.

There is heavy decoupling throughout the set; the plate supply for each RF tube is isolated with a 2.5 K resistor and a 0.1 μF capacitor. There are two separate AVC lines - one for the RF amplifier, one for the converter and IF amplifier. After a five-minute warmup, the set is quite stable and free from drift. Tuning is smooth and precise. The few AM stations still operating on the 20-m amateur band were brought in without difficulty.



Controls are (left to right): on-off-tone, RF gain, tuning, bandswitch, and volume.

In a performance comparison of the M-81 with a contemporary communications receiver (RME-69), the M-81 appeared equal to the RME in sensitivity, image response, selectivity and stability within its limitations. If the M-81 had a BFO, it would be a satisfactory communications receiver. Since the average SWL cannot copy CW, and SSB was not used in 1934, I suppose GE saw no reason to go to the expense of installing a BFO.

MEET THE COLLECTORS

Rodney Schrock, KD3OR
402 Lincoln St., Somerset, PA 15501

RECREATING THE EMERSON BB-209

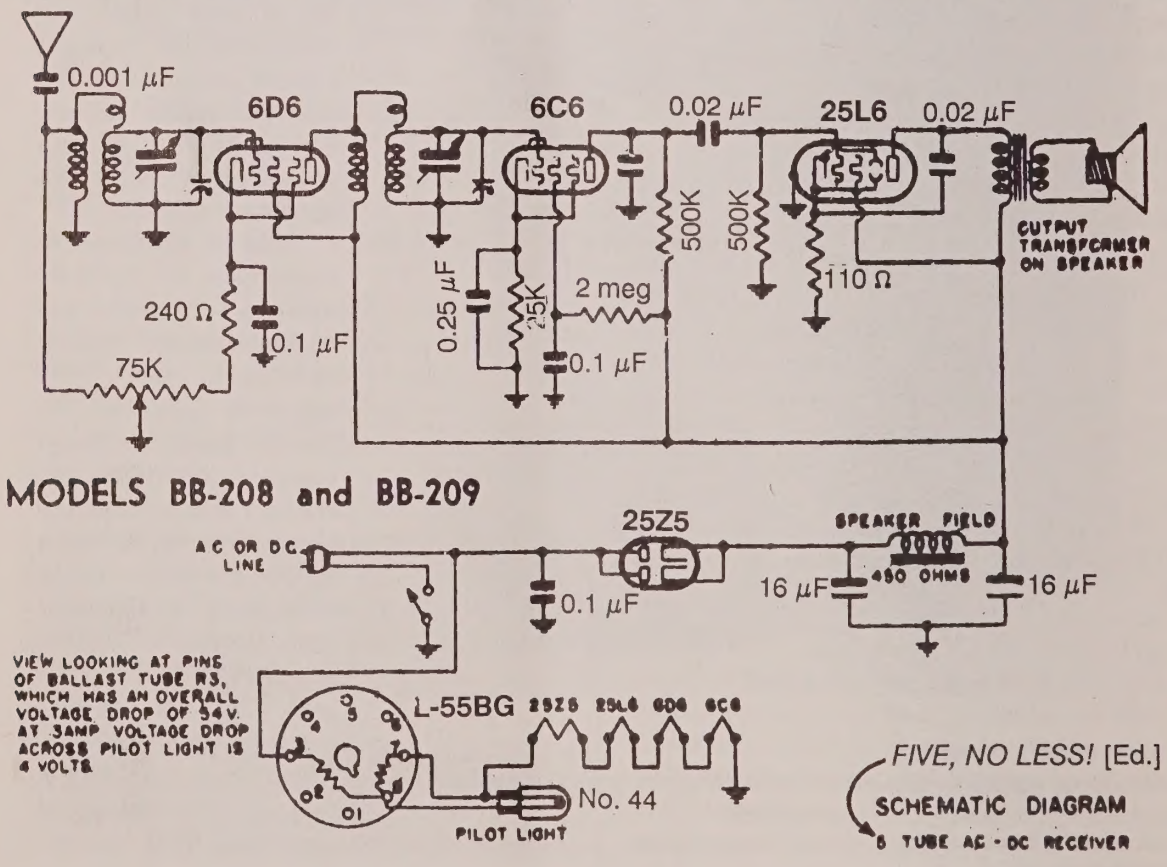
In the 1930s, various makers produced a lot of inexpensive three- and four-tube radios. The main circuits were simple superhets without an IF, or reflexed IF-AF amplifiers, and a lot of TRFs. For quite a few of these sets, heat, sometimes enough to warp the case, was the biggest enemy. Tubes and parts were crowded together with little or no ventilation. Wax melted out of condensers into tube sockets and volume controls, resistors changed value and old paper-cased filter condensers oozed wax and broke down.

Note the Arcturus Coronet chamfered-top metal 25L6.

Despite their shortcomings, these sets gave rather decent performance in our area; signal strengths were almost equal and stations weren't close together on the dial, hence AVC and selectivity weren't required. They were good second sets for the bedroom or kitchen.

These sets were tedious to fix, but their troubles were simple. If repairs were too costly, the customer usually preferred to junk the set. Perhaps these were the original throw-away radios. In 1951, our local AM station went on the air, occupying a space of one-fourth or more on the TRF dials. This condition hastened the demise of these sets, mostly replaced by the popular five-tube superhet.

In spite of the TRF's performance, the circuit was very important to me when I was a teenager beginning to build radios. Battery-operated TRFs with individually tuned stages took me out of the regenerative era with clear, howl-free reception.



As a result, I stayed with TRFs for a while before moving on to the more complex superhet. Also, I was still influenced by the projects in Popular Science's Radio for the Millions.

At this point, a radio repairman lent me his National Radio Institute course. I read and reread through the stack of small books and picked up a lot of valuable information on how radios worked and how to service them. I read how TRFs and superhets worked, DC voltage distribution, ganged variable condensers, trimmers and oscillator tracking, At the end of each (well, almost each) book I took the little written test on the back pages.

In one of the books, to illustrate a trouble-shooting lesson was the schematic of an Emerson BB-209. Because it looked simple, I built my own version, having studied ganged condensers and how to connect them. When the set was completed, it worked OK, but was a bit unstable and I blamed this on improper lead dress and iron-core coils - too much Q.

Recently, to refresh my memory, I built another version of the same radio. To drop the heater voltage, I used a five-tube ballast plus a good old WECo 10-W wirewound resistor. For a speaker, I used a Brand X dynamic, the original having been a six-inch Rola from a De Wald Dynette. I wound antenna and RF coils on fibre tubing. Later I changed to the traditional Meissner 14-1026 antenna and 14-1027 RF coils and results weren't too bad; very stable. My RF coil was almost as good as the Meissner, but the antenna coil lacked sensitivity - perhaps not enough turns in the primary, spaced too far from the secondary.

It was the same old TRF - not enough selectivity, poor sensitivity, no AVC. But still important to the beginning builder, as it gave me a multi-stage AC radio, with single-dial tuning, and a loudspeaker - a big leap forward.

(Continued from p. 38)

AWA HOLCOMB MEET

The annual Spring meet at the Museum Annex on May 4 was enjoyable all around, with 30-plus vendors in the flea market. The lunch at the American Legion hall drew a full house of 102 guests. Auction material was not as desirable as last year, on average, but there were some goodies:

AK 35 43
Ampex 400 tape deck and heads, fair 9
BC-906 frequency meter 11
Browning-Drake 4-tuber, '20s 66
Philco console ~1930, needs mainly grille cloth . 12
Radio table/speaker, '20s, nice 50
Sams Photofacts Nos. 1100-1400, 5 boxes 15
Setchell-Carlson 12" portable TV 7
Supreme 339 radio analyzer, good 10
Utah mini-horn speaker 5

TRANQUILITY MEET RESULTS

May's one-day AWA meet at Tranquility, NJ was yet another success: about 60 vendors in the flea market and great weather. The luncheon was attended by about 70 members, who saw a slide presentation on the "Gibson Girl" transmitter (February OTB) by Ludwell Sibley, with a demonstration . . . in strict conformity with Part 15 of the FCC rules, of course . . . Thanks go to John Richardt and Richard Ransley for organizing ing the meet.

ARCA CONVENTION ENJOYABLE

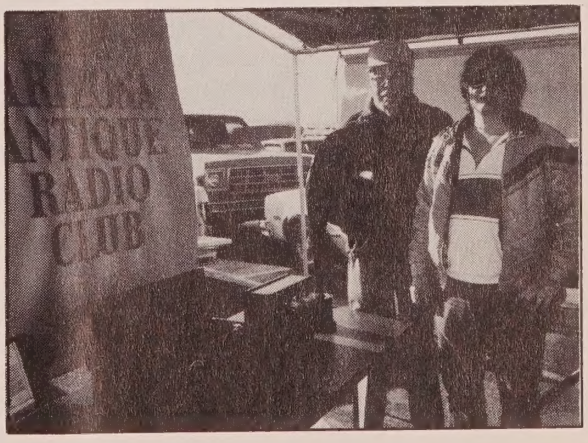
The 1991 convention of the Antique Radio Collectors of America in June is reported to have a success, with a well stocked flea market filling the rear lot of the Holiday Inn in Timonium, MD. Hosted by the Mid-Atlantic Antique Radio Club, the event included sessions on such diverse topics as cabinet refinishing and classic-age radio programming. The old-equipment contest featured a display by Michael Prosise of Philco metal-case radios - the scarce flower-painted ones - arrayed in the same way as in a contemporary Saturday Evening Post advertisement; also a display by Robert Lozier of Italian receivers. [LAS]

AARC DISPLAY AT SCOTTSDALE

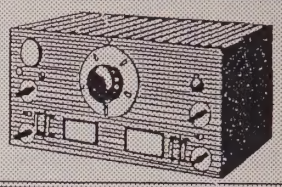
On March 16th the Arizona Antique Radio Club set up a display booth at the Scottsdale Amateur Radio Club hamfest. Members brought early radios which made quite an eye-catching display. Hundreds of people came by to look and talk about the equipment and the beginning days of radio.

We had a "Gibson Girl" emergency transmitter on display. One visitor had an unusual story to tell: "I actually used one of those!" He had been downed in Alaska and the radio brought him help.

Matt Erdahl was in charge of the booth. The picture shows him and myself (with AWA cap) at one of the tables. At the left is an Aeriola, then a nice Grebe receiver, and then a Western Electric 7-A amplifier and speaker. [Charles Brelsford]



THE COMMUNICATION RECEIVER



EDITED BY
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THE "ALL-STAR SENIOR" - A DEPRESSION RECEIVER

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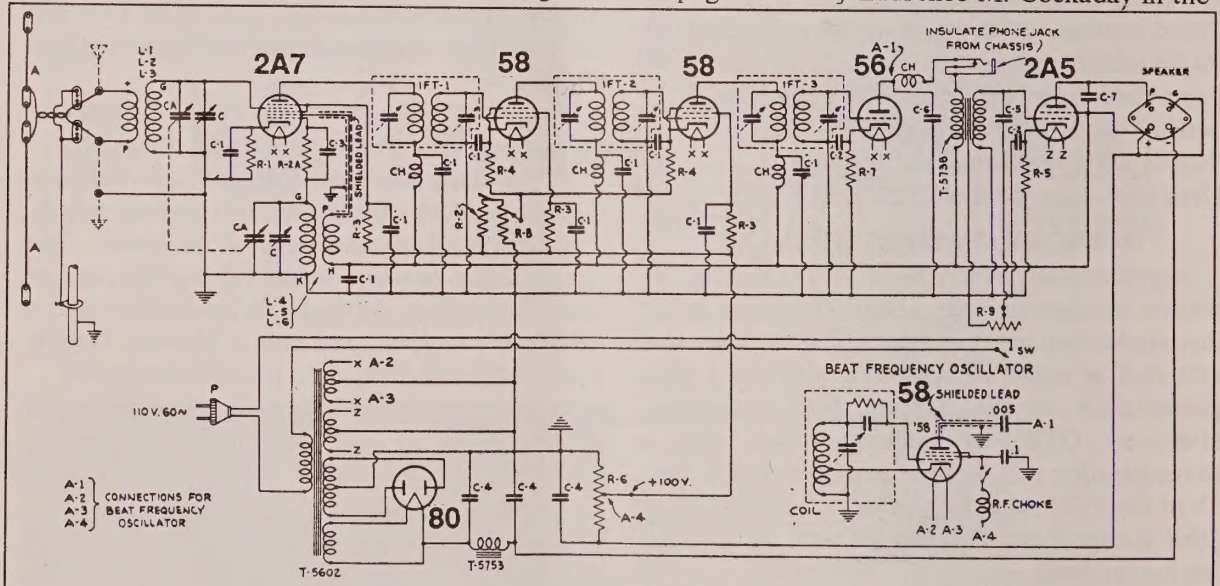
The year is 1935. The Depression is in full swing and funds are scarce for the high-school lad interested in short-wave radio. Unable to afford a factory-built receiver, he discovers a low-priced "foundation unit" manufactured by Thordarson. He builds the set and uses it for short-wave listening until licensed as W8VVS in 1941, and then continues to use it on 160 and 75 meters. In due course it is replaced, and sits on the shelf for almost 50 years. Recently restored by the author, now W3VVS, it works again. Here is its story. -K3ZJW

In the early 1930s the Thordarson Electric Mfg. Co. of Chicago published a series of "Transmitter Guide" booklets for the radio amateur. The circuits were state-of-the-art at the time, and had been reportedly constructed and tested by the Thordarson technical staff, many of whom were licensed amateurs. Not only did this effort produce several fine publications on the construction of transmitters, but through Thordarson, "foundation units" were made available, consisting of metal chasses and panels, pre-drilled and punched for sockets, terminal strips, meters, and other parts. An instruction sheet illustrating the location of parts and step-by-step assembly, and a schematic diagram came with each package.

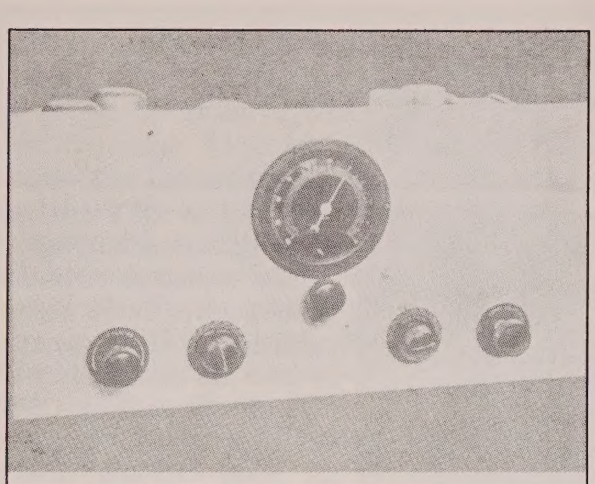
Parts used in the construction of the transmitters were standard, readily available from most supply houses. Naturally, Thordarson filament, plate and audio transformers, as well as filter chokes, were specified in the list of parts. Furthermore, each foundation chassis was drilled and punched for the specified transformer or choke, encouraging the constructor to purchase the company's products.

In due course, consideration was given to a short-wave receiver kit to be marketed in the same manner as the transmitter foundation units. The "All-Star" was introduced in late 1934 as a superheterodyne receiver intended for construction by short-wave listeners and amateurs. A two-page article by Laurence M. Cockaday in the



L-1	Meissner 20 Meter Detector Coil	CA	35 MMFD. Hammarlund Dual Cond.	CH	Meissner 16 MH. R.F. Choke	R-4	1000 ohm Ohmite Resistor
L-2	Meissner 40 Meter Detector Coil	C-1	0.1 MFD. Cornell-Dubilier Cond.	IFT	Meissner 370 KC. I.F. Transformer	R-5	500 ohm Ohmite Red Devil Resistor
L-3	Meissner 80 Meter Detector Coil	C-2	1.0 MFD. Cornell-Dubilier Cond.	C-7	.01 MFD. Cornell-Dubilier Cond.	R-6	25,000 ohm Ohmite 55-watt Voltage Divider with Two Clips
L-4	Meissner 20 Meter Oscillator Coil	C-3	.0001 MFD. Cornell-Dubilier Cond.	R-1	500 ohm Ohmite Resistor	R-7	50,000 ohm Ohmite Resistor
L-5	Meissner 40 Meter Oscillator Coil	C-4	8 MFD. Cornell-Dubilier Cond.	R-2	10,000 ohm Ohmite Resistor	R-8	10,000 ohm Volume Control—Potentiometer Type
L-6	Meissner 80 Meter Oscillator Coil	C-5	.003 MFD. Cornell-Dubilier Cond.	R-2A	25,000 ohm Ohmite Resistor	R-9	100,000 ohm Tone Control—Potentiometer Type
C	140 MMFD. Hammarlund Star Cond.	C-6	.0005 MFD. Cornell-Dubilier Cond.	R-3	5000 ohm Ohmite Resistor		

All-Star Senior. Note the "hot" phone jack - *don't use a plug with a metal shell!*



"All-Star," original version.

Rear view.

September issue of "Radio News," and a full-page ad in the same issue, extolled its virtues. The magazine participated in the promotion by offering a four-page construction folder. The foundation consisted of a punched chassis, a front panel, and a small coil shield. Complete instructions included the wiring diagram, schematic, pictorial layout, parts list, and step-by-step procedures for wiring, adjusting, and operating the finished receiver.

The parts list to construct the "All-Star" receiver reflected the specific manufacturers' components for which the foundation was punched. Co-sponsors of the receiver design with Thordarson (the self-proclaimed "Stars") were well known: Belden, Cornell-Dubilier, Crowe, Electrad, Hammarlund, Meissner, and Ohmite.

The circuit used 2.5-volt tubes; a 2A7 pentagrid converter, two 58 pentodes as 370-kHz IF amplifiers, a 56 triode power detector, a 2A5 pentode audio output amplifier, and an 80 full-wave rectifier.

Looking toward sales to radio amateurs, a optional beat-frequency oscillator was made available to enable CW reception, and the chassis was changed to mount the BFO coil and 58 oscillator.

Later in 1935, another "All-Star" receiver was introduced, utilizing the newer 6-volt tubes. It became known as the "All-Star Junior," a 5-tube set (including rectifier) using multipurpose tubes which included the BFO circuit.. The "All-Star Super-6" name, used for a while, was dropped from the advertising, and the receiver renamed the "All-Star Senior."

The foundation unit for the "Senior" cost $2.50, from such mail-order houses as Allied Radio, Wholesale Radio Service Co., Newark Electric, Lafayette, etc., and from local radio stores and distributors handling Thordarson components. The builder was free to substitute parts, although the literature encouraged purchase of the "official" components. The total cost of parts to build the set was approximately $34 (1935 prices). Thordarson claimed that over 6000 foundation units had been completed.

To reduce costs, parts such as wafer tube sockets, tube shields, resistors, tubes, and volume controls could be salvaged from broadcast sets. During the latter days of the "Great Depression" the foundation units enabled many a builder to buy only the parts needed to complete the set.

The Crowe airplane-type dial in the center of the front panel operated the Hammarlund dual 35-pF band-spread condensers. Two 140-pF units were used to band-set the local oscillator and antenna circuits. The gain of the 58 IF stages was controlled by a potentiometer in the cathode circuit. The 370-kHz IF provided high gain and reasonably sharp selectivity.

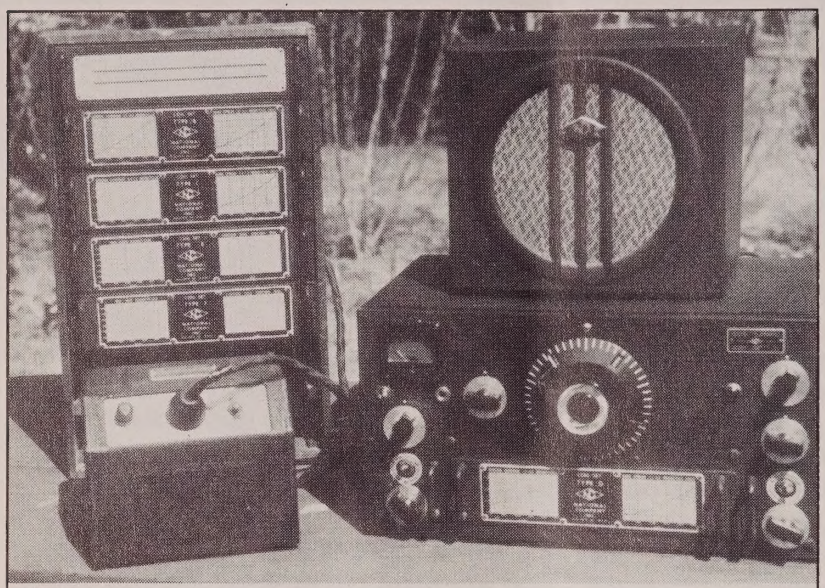
The Meissner plug-in coils were identified as 80-, 40-, and 20-meter sets; later, coils for the 10-meter band were made available. Others covered the 160-meter and AM broadcast bands.

The recommended speaker was an electro-dynamic unit with a 2500-ohm field coil. Following prevailing practice, the audio output transformer to match the 2A5 was mounted on the speaker frame and a four-wire cable and plug connected the speaker to the receiver chassis. A Jensen 8-inch unit was a logical choice for the builder.

In my own experience of building the "All-Star Senior" as a teen-ager with limited knowledge, two things occurred which caused problems not solved until I restored the receiver some 50 years later! First, the Meissner RF chokes supplied for the set were 1.5 mH and not the 16 mH called for. Today the IF amplifier operates much better with the correct chokes. Then, the Meissner BFO coil was a 465-kHz unit, not the 370-kHz one required. This was not obvious until the oscillator frequency was measured with a counter. I always suspected the frequency was in error, because in order to receive CW it was necessary to tune the BFO so that a harmonic fell on the received signal. Adding a capacitor in parallel with the trimmer enabled correct operation on 370 kHz.

AN HRO STORY

Michael D. Tannenbaum, K2BN
42 Bulaire Rd., E. Rockaway, NY 11518



The complete set: coils, power unit, speaker, and receiver itself.

In late 1945 the National Company had a major problem. World War II was over and, not only did they have nothing to sell, but the military was dumping their best products on the market as surplus.

How National coped (or failed to cope) with this problem is the story of the HRO-5A. First advertised in QST in October 1934, the HRO was a huge success. When WW II broke out, National had the best communications receiver on the market. Its familiar black box and distinctive PW dial appeared in photographs of advanced amateur and commercial stations until the late 1940s.

Early in the war, National produced the RCE, the HRO-M and the HRO-MX. These units used the same glass tubes as, and were substantially identical to, their civilian counterparts, but were supplied without amateur bandspread coils. By 1944, the HRO-5 and HRO-W were in production. These receivers had metal tubes and an improved crystal filter, but were also supplied to the military without bandspread coils. In addition, HRO variants were made to Navy requirements. These included the RAS (see Paul Bohlander's article in the October 1990 OTB, Vol. 31 No. 30), RAW, and RBJ. All the Navy versions were supplied without S-meters and crystal filters, similar to the prewar HRO Jr. series.

When National offered the HRO-5A in 1946, it had to compete with all of the above receivers. Needless to say, the surplus sets were offered at significant discounts from the $310 price of the HRO-5A. For example, the HRO-W was widely advertised in QST and other ham magazines at $217.

The executives of National were keenly aware of the weakness of their marketing position. In the February 1946 National column/ad in QST, S. W. Bateman tried to distance the newly released HRO-5A from its war-surplus cousins. Poor Mr. Bateman had difficulty in hiding his pride over the war-surplus HRO. The best he could do was to point out that the military HROs lacked bandspread coils, and offered to sell special sets for $60. The fact was that the HRO-5A was basically the same receiver as was introduced in 1934. Physically, the set was still housed in a black box with a separate power supply and plug-in coils. The operating controls were also almost the same. Only a skirted knob on the crystal filter, and short-handle toggle switches for the AVC, B+, and S meter cutoff switches, differentiated the old and new HROs.

In retrospect, the internal differences were also superficial. Tube types changed from the glass 2.5-volt originals to six-volt types and finally to six-volt metal equivalents. IF cans changed from round to square, and there were many other minor changes. As far as major technical changes were concerned, the HRO had entered a time warp. For those interested in tracking the glacial evolution of the receiver, "Dating the Early HRO" by Charles Fisher in the AWA Review Volume 4 provides much detail for prewar HROs.

When the HRO-5A was advertised in the January 1946 QST, as a "new" receiver incorporating design improvements, the hams were not fooled. They knew advertising hype when the saw it. As far as they were concerned, the HRO-5A was an HRO-W with a square S-meter and bandspread coils. National quickly released the HRO-5A1 with a series noise limiter in late 1946 and the HRO-7 in early 1947. Although the HRO-7 offered a new stabilized oscillator and a modernized cabinet, it was essentially an HRO-5. National did not really upgrade the design until the HRO-50 was released in 1950.

Although the HRO-50 and its successor the -60 were to endure until 1964, National never re-

gained the technical dominance that it had in 1945. The HRO had been "cutting edge" in 1934 but was obsolete in 1945. New receiver technology offered by Collins in 1946 ultimately dominated the market. To the end, HROs still bore an unmistakable resemblance to the 1934 original. The HRO's 30-year life, which spanned dramatic changes in the art of communication-receiver design, is a testament to the genius and foresight of its designers. For the collector of communication receivers, an HRO is a prize. Because of simplicity and rugged design, it can usually be restored to good working condition. Physically it is often in good shape, having been treated as a cherished artifact of bygone days.

HROs fall into five broad categories: the prewar models, the wartime HROs, the postwar versions, the gray-cabinet types, and the rare transistorized HRO-500 and -600. The gray models include the HRO-7 (essentially an HRO-5A), the HRO-50, and the HRO-60. The -50 and -60 include an internal power supply. The HRO-500 and -600 are totally different. Both are completely transistorized and use complex frequency-synthesis schemes to replace the plug-in coils.

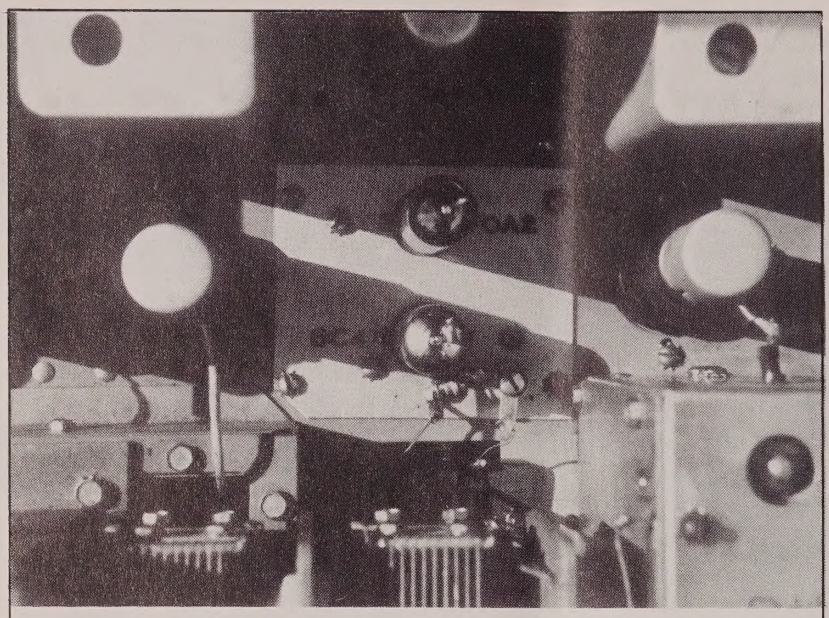
HROs were often sold without a power supply. If a National power supply is available, it should be a type 697 for 6-volt tubes or a 5897 for 2.5 volts. Most HROs came with four sets of coils. Not all coil sets were bandspreadable. Regardless, the coils should be stamped with the same serial number as the set itself. Speakers for all models are rare.

HROs of all types are in demand. As might be expected, prices for all categories have been rising, with the early versions more expensive because of rarity. Recently the later models have become more desirable. The units had outstanding audio performance and the rebirth of AM phone on the ham bands has increased interest in quality audio.

The main problem with old HROs is finding one intact. Hams loved to improve their receivers. It is not unusual to find a vintage set with new IF transformers, S-meter, noise limiter, voltage regulator, and even a product detector. Because of its slow evolution and relatively open layout, HROs were easy to upgrade. It is therefore dangerous to buy one without inspecting it. Recently I had an opportunity to explore these dangers. I was offered an opportunity to acquire two receivers "sight unseen." Naturally, I jumped at the chance. I had been told that they were complete, but upon arrival, I was not surprised that they were not as expected. One proved to be an early HRO that had been "improved" by its owner. Not only did it fail to work, but holes had been drilled in the front panel for a noise-limiter adjustment control and an on-off switch. Such receivers require complete disassembly and mechanical restoration of the front panel. A good guide in this process is the article by Bill Fizette and John Wiesner, "Restoration of the Early HRO Receiver" in the December 1983 OTB (Vol. 24 No. 3) and the June 1984 issue (Vol. 25 No. 1).

Coil sets, including the scarce broadcast-band pair at bottom.

The other receiver was unusual. Its identification tag indicated that it was an HRO-5TA1, but the audio gain control and limiter control were swapped. The main tuning knob had a mirrored center like that of an HRO-7. Inside, there were two tubes in place of the 6K7 oscillator: a 6C4 and an 0A2. Where the normal 6SQ7 2nd detector tube should be, a 6H6 was located. With a sinking feeling, I opened the bottom, but was surprised to see that the receiver appeared to be absolutely unmodified. The slightly brown color of the tube shields and chassis indicated that the receiver had been fungus-proofed for military use. Stamped on the lid was the date, September 26, 1946, that the work had been done. Confirming that this was a military HRO was the Navy identification code CNA-53110 stamped on the crystal-filter housing. Unlike military HROs of the period, the coils, except for the "A" set, were bandspreadable and had the familiar HRO-5A labels. The A coil was not only bandspreadable, but had the slide-rule decal characteristic of the later model HROs. All coils were stamped with the serial number of the receiver! Checking my QSTs, I determined that this HRO was produced within



The new oscillator, compensating capacitor, and regulator tube.

the period that the HRO-5A and HRO-5A1 were advertised. Since mine was clearly unusual, I examined all of the HRO improvement articles published during the period. Finally, in the June 1949 QST, I found an article by Loren Windom, W8GZ, who described the exact steps required to update an HRO-W or earlier model to an HRO-7. In this article he describes the steps required to stabilize the oscillator, which include the following:

- Replacing the 6C6 oscillator with a 6C4-OA2 combination mounted on a subchassis.
- Modification of the coil sets, adding a temperature-compensating capacitor placed near the oscillator tube.
- Replacing the second detector with a 6H6; adding a 6H6 noise limiter and 6SJ7 first audio stage.

Because all the modifications listed had been applied to it, I was now sure that my HRO-5AT1 was an HRO-7 in an HRO-5 case. However, the color of the main tuning dial troubled me. The HRO-7 had been released in the new National gray cabinet and the PW tuning dial was light gray to match. Another advertisement, in the May 1949 QST, resolved the problem. The rack-mounted version of the HRO-7, the HRO-7C, had been supplied in a black crackle finish and the knob was black to match. My HRO was "factory stock."

Obviously, National had had the ability in early 1946 to release an HRO with significant improvements. With its highly stable oscillator and effective noise limiter, the improved HRO-5A1 might have given the Collins 75A some real competition. National's conservative move, to hold up the release of the HRO-7 until new sheet metal was ready, proved to be a costly error. National never recovered their momentum and the rest is history.

The process that I went through to identify the HRO and study its differences illustrates the importance of caution and a good reference library. Collectors should avoid hasty actions to repair old radios. Radios were continally improved by their manufacturers. A factory "mod" is very difficult to differentiate from a quality repair-shop or "ham" modification. Collectors must learn to distinguish when restoration is unavoidable or a good cleaning will suffice. There is no question that a 50-year-old radio will have leaky capacitors and resistors that have changed value. Should the radio play "as good as new," or should it be preserved intact, leaky condensers and all, as an example of the radio manufacturer's art? I, for one, cannot answer this question. I like radios that play well, and will tinker with a set endlessly until it does. However, I try to avoid replacing parts unless they are inoperative. The fact is that a beautiful restoration will be less valuable than an original which has been cleaned and preserved intact.

THE RDG: AN UNUSUAL HRO-DERIVATIVE

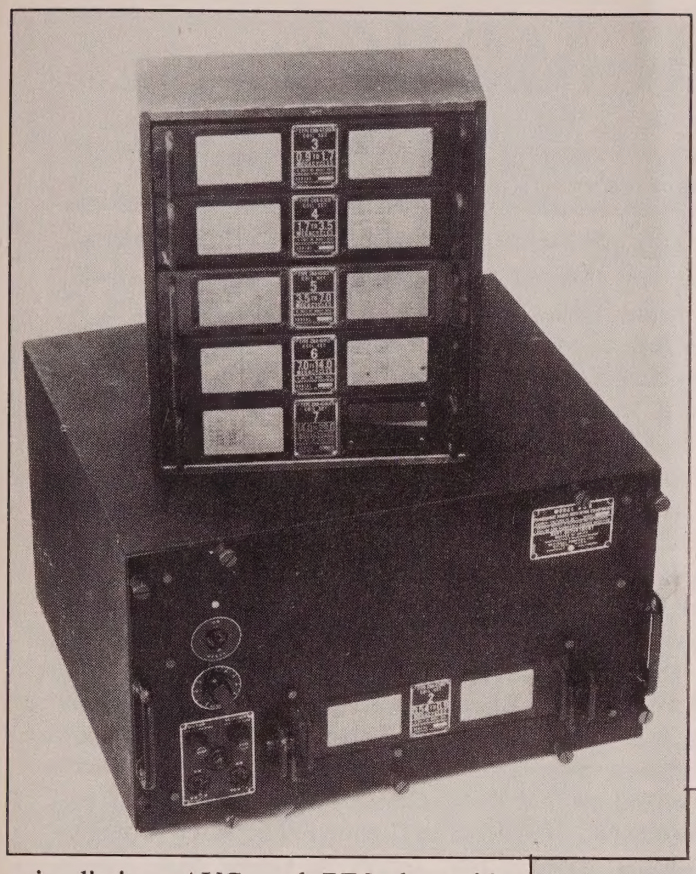
Alan Douglas
Box 225, Pocasset, MA 02559

Ludwell Sibley
44 E. Main St., Flemington, NJ 08822

A little-known offshoot of the metal-tube HRO receiver is the Navy RDG (CNA-46ADU). This set, built for spectrum-surveillance use, is intended solely to operate an external oscilloscope display. Like a panoramic adapter, the 'scope displays frequency on its horizontal sweep, and signal strength on its vertical axis, thus showing all activity in a given frequency band as a series of spikes.

A system like this is valuable for frequency-management or electronic-intelligence purposes. Once an unknown (or suspicious) signal appears, a second, conventional, receiver would be used to identify it, possibly using a separate frequency meter like the LM-series to measure its exact frequency. A direction-finder network could then be brought to bear.

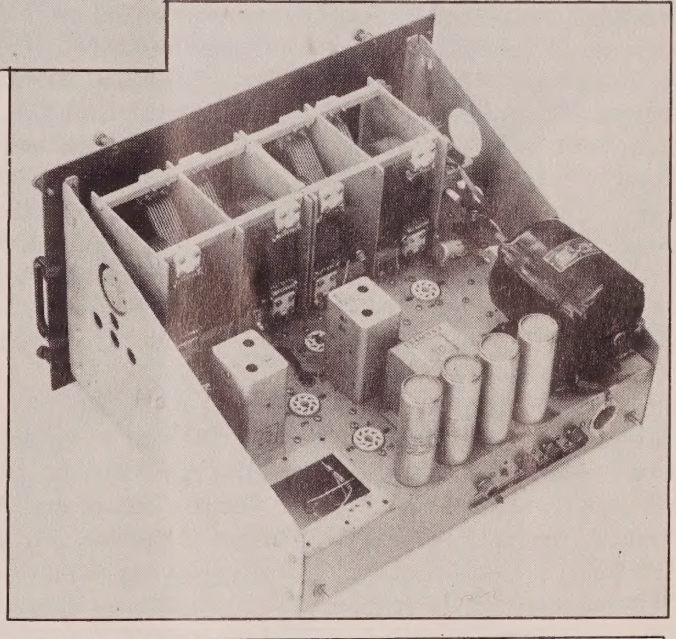
The RDG is a repackaged HRO Jr., less the



intended for a 455-kHz IF, with nameplates specifying their being part of the RDG set. Frequency ranges differ slightly from the usual for HROs: 0.54-0.9, 0.9-1.7, 1.7-3.5, 3.5-7.0, 7.0-14, and 14-29 MHz. The tuning capacitor is an unusual split-stator design with two sections in series for mechanical balance. Front-panel controls are minimal: power, motor, and plate switches, fuses, a pilot light, and an RF gain control. The set is housed in a panel-and-cabinet format 11-7/16" above the shock mounts and 16" deep. Weight is a dainty 100 pounds.

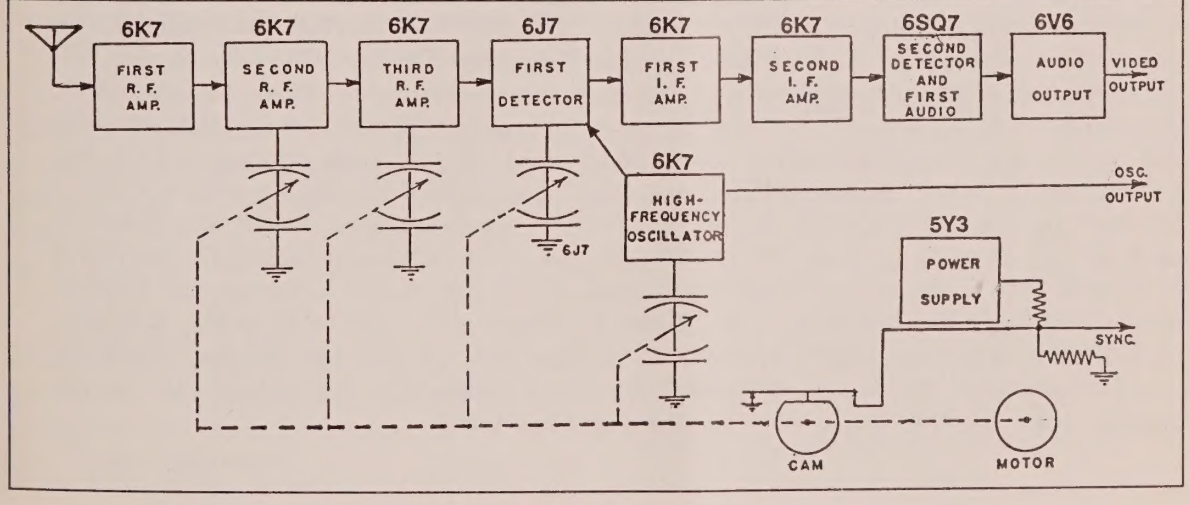
The RDG output was to be viewed on a "panoramic dual display unit, experimental model XCW." During the several months before the XCW was ready, modified Dumont 241 scopes were pressed into service.

The National drawings covering the RDG are dated June 1944. The set pictured, S/N 62, is stamped May 1, 1945. *Photos: Alan Douglas.*



noise limiter, AVC, and BFO, but with power supply built in. The output tube is triode-connected as a cathode follower. Because tracking of the RF stages is important in this application, it has an untuned antenna-isolator stage. A 1/20 HP synchronous motor constantly turns the tuning capacitor at 900 RPM through a worm gear. Thus the receiver sweeps its frequency band 15 times per second. With each revolution, a cam switch sends a synchronizing pulse to start the 'scope sweep. There is no provision for manual tuning. The IF stages are loaded with resistors to give a wide bandwidth of 10 to 15 kHz (6 dB down).

The RDG uses non-bandspread coilsets



NEW MEMBERS

AWA welcomes the following new members. We list all new members routinely - if your name does not appear within six months, please advise the Editor. If you do not wish to be shown, just mark the application form accordingly. AWA does not provide an address list or other directory of its membership.

Carmen **Ambroggio**, WA9GFP, CA; Richard **Anthony**, CA; Frank D. **Atwood**, ex-W1KEQ, MA, Atwood TV & Radio Svc., Inc.; Junius J. **Bailey**, W5FTW, TX, U. S. Army Signal Corps; Charles E. **Barnes**, SC; Lucas J. **Bazin**, W2IRS, NJ, GE; Brown **Beezer**, WA1NZR, RI, Philips, Amperex; A. K. **Bell**, Australia; B. Michael **Bell**, FL; Gordon **Bell**, Jr., WA2YQY, NY; Charles L. **Best**, MD; Ted **Bieryla**, PA, self-employed - consumer electronics; Robert C. **Bonn**, Jr., N4YZU, VA; Ned **Borger**, PA; Julian L. **Bourquin**, N1IQM, CT; Charles R. **Bradford**, TX; Joanie **Branson**, KA6V, OR; Harry **Burhans**, W3FM, PA, Philco, El-Tronics, Burroughs; Dennis B. **Burk**, CA; Aaron **Burleson**, WA4OOJ, NC; Charles Buttacavoli, NY; Bob **Carter**, WA, ARINC Research Corp.; Rosemarie **Caruso**, NY; Charles **Chilton**, WG5M, OK; Paul **Christensen**, N9AZ, FL, director of engineering, Taylor Communications, Inc.; John A. **Cliver**, NJ; William **Cole**, NY; Dana R. **Cowles**, WA8IWZ, WV, 35 yrs. with AT&T; James L. **Craigmile**, MO; Roger T. **Curran**, NY; Hugh **Davey**, NJ; Thomas G. **Davis**, TN; John C. **Day**, NY; J. G. **DiCarlo**, GA; Ken **Dick**, NC; Robert N. **Dissler**, IN; Paul A. **Dodd**, CA; Fred C. **Eastman**, K1CSO, MA; Edmund J. O. **Eberdt**, Canada, has small electrical-wireless museum; Harold R. **Ecke**, NE5K, TX; John P. **Erdle**, Jr., KE2PR, NY; Robert **Eslinger**, CT, owner, Antique Radio Restoration & Repair; William C. **Euker**, FL; James N. **Falls**, CA; Frank **Feczko**, NJ; Louis J. **Femine**, NV; John **Fitzer**, KA3TNS, PA; Curtis J. **Flaten**, MN; John L. **Fleener**, W5QWU, LA; Dick **Foster**, W2IE, TX; Henry **Franciosi**, IK2HSW, Italy; Wayne **Francis**, WA3VAT, MD; Robert **Fretz**, OH; James Ray **Galyon**, TN; David **Geiser**, NY, WA2ANU, Boeing, Sprague, GE (AESD); Leonard M. **Gessin**, WA2ZNC, NY, Monroe County Public Safety Communications; Mark **Gilbert**, NY; Charles F. **Gramm**, KB4ZB, NY; Jeffrey R. **Green**, MA; Joseph **Grispin**, NY; Frank **Hagenbuch**, PA; Gordon D. **Hall**, CA; Terry **Hall**, IA; Donald A. **Hanson**, CT; Fred **Harder**, MI; Jay **Harmon**, LA; Richard **Hartzman**, KE2IA, NY; Keith **Havey**, NY; Read **Hayes**, FL; Daniel C. **Henricksen**, CA; Louis F. **Hoffart**, OH; Thomas **Jardine**, Jr., PA; William J. **Jones**, NY; Takao **Kaneko**, Japan; Stan **Kenyon**, W7KX, AZ, ex-ship operator, broadcaster, etc.; Wendell **Kollen**, W8LEO, OH, WHTC, WOOD, WZZM; John E. **Kotich**, MA; Roger W. **Kuchera**, K1TG, CT; Norman M. **Landis**, MO; Michael **Lawlor**, CA, owner of Bare Bones Press; Mike **Lipke**, PA; George A. **Lucchi**, W6NVN, AZ; Robert E. **Lutz**, Jr., KS; Cal **Mackey**, NY, radiotrician; John **Mayer**, DE; Ed **McCabe**, N2LZY, NY; Gerald E. **McCarthy**, AA2CQ, NY; William E. **McGrath**, NY, WW II Navy CW operator; Donald McGrew, IN; Mike E. **Mitchell**, CA; Gentaro **Miyairi**, Japan; William L. **Moore**, KH6ASH, HI, RCA; Koichi **Nakamura**, W9/JA3HTP, IL; Darrell O. **Noakes**, Sask., news reporter 1971-80; William E. **Neeley**, K7INK, CA; Lewis C. **Newhard**, PA, AT&T; Kevin D. **O'Connell**, MA; Dennis J. **Osborne**, NC; Jacob P. **Panzarella**, CA; Robert D. **Parvin**, PA; Mark G. **Peeling**, NY; Torsten **Pettersson**, SM6ETO, Sweden; Vernon G. **Pietz**, WI; Richard **Prester**, WA2IFS, NJ; Thomas J. **Provost**, NJ; Randy **Rand**, AA2U, NJ; Ray **Redwood**, KA5HCX, TX, ship operator, RAF wireless op.; Arthur E. **Richardson**, NF1V, NH, NH Network, TV transmitter engineer; Jose Ramon **Rodriguez** Vazquez, Spain; Thomas S. **Rousseau**, K7PJT, OR; Mike **Rowe**, WB1FSR, CT; Mark **Russell**, NY; Dick **Saunders**, K2RJN, NY; Bob **Schafer**, WA7IHN, OR; Chris **Schiotz**, K2PGB, NJ, USN (ETN-2) P2V RM; WHWH, Princeton, NJ, first flying traffic reporter; John A. **Schmidt**, CA; Adam **Schoolsky**, KM4MF, CA; John **Shafer**, OH; John H. Shaffer, W3SST, PA, self-employed, broadcast and two-way radio; William **Shields**, VA; R. Blake **Shrout**, K4CGC, VA, 30 yrs. Signal Corps; radio engineer, Fairfax County; Al **Sienkiewicz**, KB2LYK, NY, Stromberg-Carlson; Norman L. **Smith**, WA4VSO, FL, radio operator, US Coast & Geodetic Survey; Otto E. **Spokas**, W4QDP, VA, chief engineer, NBS Particle Accelerator Facility ; Chris **Sterling**, VA, WHA AM-TV; WTMJ AM-FM-TV; Alexander **Stock**, KW5P, TX; Robert B. **Sturdivant**, AL; Peter K. **Sullivan**, MA; Gerald D. **Tynan**, CO; Len **Ullom**, K5HZH, TX; Herbert B. **Vanderbeek**, WY6G, CA, amateur from 1935, comm. engineer from 1955, self-employed; Thad M. **Wallace**, NC; Ralph **Ward**, KA4JNO, TN; Robert F. **Wiepert**, NY; Michael H. **Wilke**, WB4AQL, GA; William C. **Wilkinson**, WE3Z, MD; Billy E. **Williams**, N2AGF, NY; Jack **Winkler**, WA6DBK, CA, ETM2 in USNR, WW II; Joseph **Wisthoff**, IN; Ross E. **Wollrab**, IL; Bill **Wysock**, CA; Jun **Yatsuyanagi**, Japan; Bazyli W. **Zajac**, MI [Thanks to Joyce Peckham.]

HISTORICAL ARTIFACTS

Old-time ads are free to members collecting and restoring equipment for personal use. **The rules:** (1) one ad per issue per member; (2) include an SASE if acknowledgement is desired; (3) material must be over 25 years old and related to electronic communication; (4) give your full name, address, and zip code; (5) repeats require another notice - we aren't set up to repeat automatically; (6) the Association is not responsible for **any** transaction; (7) we retain the right to reduce the size of the ad if over seven lines; (8) AWA does not accept commercial advertising; (9) deadline for ads in the November issue is September 5; those received later will be held for the following issue. Mail **all** ads to: **Richard Ransley, 17 Sheridan St., Auburn, NY 13021.**

FOR SALE/TRADE

De Forest Unit Receiver (9 units), 1921, good cond., comp. w/VT tube. Trade for De Forest D10, AK breadboard or Zenith Stratosphere. Pre-1930 tubes also available. Looking for Metrodyne Super 7 and Majestic 59 Studio. Can arrange pickup. Dieter Bardenheier, 50A Park Rd., Auckland 7, New Zealand.

Radio **service manuals**, tubes, test eqpt, parts, thousands of unlisted parts. No list, write with your wants with SASE. Krantz, 100 Osage Ave., Somerdale, NJ 08083.

Atwater Kent 35, wkg. cond, $70. Brown section has been repainted a little lighter than original, looks good! Freed Eisemann NR-6 Neutrodyne, untried but both audios OK, wood OK but needs stripping & refinishing, $100. Many other radios, books & tubes. Send 2 stamps for complete list. Ron Boucher, PO Box 541 (OT), Goffstown, NH 03045, (603) 497-2988.

Hammarlund HQ-129-X genl. coverage/ham rcvr: 11-tube dual-conv superhet w/6 xtal-filter positions, BFO for SSB, amateur bandspread. Asking $75 plus shipping. Walter Dean Ikes, 23253 Sagebrush, Building #7, Novi, MI 48375-4172, (313) 347-9258.

Books, hardware and test equipment. Something for all interests. Eight-page typed list for SASE. Roland Martick, RR1, Box 1668, New London, NH 03257.

Bound volume of Hugo Gernsback's "**Science and Invention**," 12 issues, May 1921 - April 1922, each with colorful front-cover pic., $120 prepaid. FREE! Philco 635 1936 console, with coverage up to 18 MHz. Modified from second detector through audio output; has two bad IF xfmrs. Cabinet good, speaker replaced with 7" PM. Have Philco service literature. Cannot ship - must be picked up. R. E. Walters, 961 McClain Rd., Columbus, OH 43412, (614) 486-3310.

Many **early radios**. For list send 60¢ US or 40¢ Canadian. QSTs 1950-1975 - make offer. Want model 14 Freed Eisemann speaker; schematic for Westinghouse WR8-R; Fada 160; dial-stringing for Bosch Amberola; good driver for RCA UZ-1325 speaker, complete set of Rider's manuals. Bill Beaton, 79 Meadowlands Dr. W., Nepean, Ontario, Canada K2G 2R9, (613) 224-1789.

Hallicrafters BC-441B. Intact but dirty from years of storage. No reasonable offer refused. George Kasdorf, Sr., RD 3, Box 251, Lewistown, PA 17044.

Old **parts, radios**, literature, odds and ends. SASE for list. Berj Ensanian, KI3V, Box 3342, Williamsport, PA 17701, (717) 326-2148.

Two **Motorola** model **77FM** chairside radios. Both need work. Cannot ship. SASE for more details. John Uscinowski, RR #1, Box 379, Greenwich, NY 12834-9519.

NC-57, dirty and untested; Microlog/ATR 6800, clean. J. Wasiewicz, 229 Sarles Lane, Pleasantville, NY 10570.

Services: **Schematics** 1920-1970, radio-ham-Canadian-misc. $4 postpaid. For manual quotes include SASE. Alton Bowman, 4172 East Ave., Canandaigua, NY 14424-9564.

RCA **PE 112A** power unit for WW II radio altimeter, ca. 1942, input 24 VDC, outputs HV for CRT & 300 VDC, 200 mA. NOS, $50 plus UPS. Ellsworth Johnson, 364 Coeur d'Alene St., Spokane, WA 99204, (509) 838-2161.

Western Electric 216As (old type with paper use-restriction tag) in good filaments, $35 each or trade for good Sylvania 10s with "S" shape envelope and carbon plate. Parker, W1YG, 87 Love Road, Lyme, CT 06371.

Will sell or trade **Federal 417** (p. 211, Douglas book) with gold-finished hardware and knob markings, w/five tubes, plays well. In customized, well finished wood case (not the phonograph cabinet it was sold in). Nice cond., $250 plus shipping. Floyd Paul, 1545 Raymond Ave., Glendale, CA 91201, (818) 242-8961.

Lotus two-way honeycomb **coil mounts**, mint, boxed, $25 ea. incl. air postage. Fin Stewart, PO Box 387 Tamworth, N. S. W. 2340, Australia.

Reconed **Zenith** 12" **speaker** #49AB249, 1250 Ω field, 5-pin plug, for model 85-359, ch. 5807 $35; 8YP4 test CRT, $10.; NIB 2-volt, 7-prong vibrators, $7.50 ea.; (octal) crystals: 100 kHz, 1000 kHz $5 ea. Jim and Nadiene Farago, 4017 42nd Ave. So., Minneapolis, MN 55407-3528, (call before visiting) (612) 722-0708.

Vacuum tubes, mainly from 30s and 40s. Send SASE for complete list and price. Want to sell entire lot of about 50 items. Wade Troyer, 680 Gateshead Road, Troy, OH 45373.

Baird **stock certificates** (John Baird - inventor of mech. TV scanner, see Nov. '88 OTB) $55; Collins Radio stock certificates $10, warrants $6. J. J. Papovich, 53 Magnolia Ave., Pitman, NJ 08071.

AR-88LF parts, new original: A1 IF crystal 735 kHz, condensers C-14 700 pF, C-111 2700 pF, C-105 560 pF. Want Ozarka 95. Gordon Wilson, 11108-50th Ave., Edmonton, Alberta, Canada T6H 0H9, (403) 434-6257.

HRO **RAS** w/pwr supp., 3 tuning units $125; HRO-W w/PS, 3 tuning units $125; NC-125 with speaker $115; Tektronix 422 dual-channel 15-MHz BW $150. You pay shipping. Michael Tannenbaum, K2BN, 42 Bulaire Rd., East Rockway, NY 11518.

Antique radios, related books and magazines; electrodynamic speakers; tube testers, tubes, and misc. Must pick up in Balto area. Richard Fitch, 8106 Analee Ave., Baltimore, MD 21237.

Regency TR-1 transistor radio, red. For trade only for green TR-1. White TR-1 to trade for gray. Eric Wrobbel, 20802 Exhibit Court, Woodland Hills, CA 91367, (818) 884-2282.

Radio's Master catalogs 1950s-60s $10; Clapp-Eastham C-3 Radak $450; Stromberg-Carlson 1A $150; W. T. Grant Co. 5-01As, orig. kit & blueprints $150; Eico, Knight, W. E. tube testers $40-$100; RCA dot-crosshatch gen. WR-46A $40; linear amp. BTI-LK2000HD using 3-1000A $950 and parts to build 13 more linears. Francis Yonker, 7 Old Farms Rd., Saddle River, NJ 07458.

"Electronics" mag.: 1943-44, 16 issues; 1945-47, all 36 issues. Good cond. Radar secrets, TV development, tube history, etc. $50 for lot; to be picked up. Ludwell Sibley, KB2EVN, 44 E. Main St., Flemington, NJ 08822, (908) 782-4894.

WANTED

Greenhorn collector wants **floor-standing console** from 30s as anniversary present for wife who thinks the Grunow 1291 especially gratifying. Robert Sturdivant, Route 1, Box 565, Trussville, AL 35173, (205) 681-4941.

SCR-300. **TBY-8** accessories. H. T. Brown, 4141 West L-2, Lancaster, CA 93536.

Type 69 detector-amp. tube (similar to type 75) used by the military before WW II. Have W. E. gold tip or other rare tubes for trade or cash. Ross Smith, 1133 Strong Ave., Elkhart, IN 46514.

AK **Breadboard parts** (any cond.), Type 11 tuner, RF coils, single tube sockets, TA units, orig. boards, binding posts, and potentiometer. Cabinet for AK-93, 485Q and Kennedy V; driver for AK R horn; AK-228, 567 and others. Will be at the AWA meet in Rochester. Bob Nicholson, 3423 S. Long, Topeka, KS 66605, (913) 266-9473.

Dial glass for RCA Victor model A-33. Hans Alderliesten, RR 1 3718 Happy Valley Rd., Victoria B. C., Canada V8X 3W9.

Electronics Illustrated, June '61, Nov. '72; Radio-Electronics, Jan. '56, Jan. '61; Electronics World, Aug., Sep., Oct. '59; Radio News, Jan '48; Radio Craft, Sep., Nov. '47; Riders Vol. 20; Sams TSM-9; Meissner plug-in SW coils. Alvin Bernard, PO Box 6900098, Orlando, FL 32819, (407) 351-5536.

Atwater Kent model 20C in good or restorable cond. Knox Lee, 630 Shadowbrook Drive, Columbia, SC 29210, (803) 772-6593

AK 35; Freed-Eisemann sets. Bill Noro, 126 Evaline St., Pittsburgh, PA 15235, (412) 371-2988.

Public Radio producer seeks interviewees and any information and/or transcription discs concerning **WEVD** and Yiddish/Jewish radio programing from 1926 to 1960. Andy Lanset, 328 West 101 Street, 3A, New York, NY 10025.

Meissner Traffic Master comm. radio approx. 1938-40. Ray Larson, 12241½ Gorham Ave., W. Los Angeles, CA 90049.

British WW II **R1155 receiver** in orig. cond., Grebe CR-18 Special w/coils, Dictograph/Dictograd horns, WW I mil. gear. Mike Ceklovsky, 3116 Smoky Court, Sacramento, CA 95826.

WD-11 tube with tip and brass socket, fil. good or open; horn speaker and radios pre-1924; all parts from WW I period, i. e., tubes, coherer. Will pay fair prices, or swap with European tubes and radios. Patric Paris, DF3VG, Metzinger Str. 8, 7433 Dettingen/Erms, Germany, fax 7121-36670, tel. 7123-8552.

Original squarish **shade for Philco 53-706** lamp-radio combo; radios with oriental-style cabinets, esp. Sharp "Pagoda" and Crosley Gemchest (1929). Have Eveready 53 (1929) console with good original cabinet and fancy knobs, untested chassis $130. Gerald Schneider, 3101 Blueford Rd., Kensington, MD 20895-2726.

Cabinet for Philco 18, in good or restorable cond. Irvin Sanders, K3IUY, RD 3, Box FA 53, Harrisburg, PA 17112, (717) 469-2185 (reasonable hours please).

Pre-1940 ARRL Handbooks for my collection; VFO & PS for Harvey-Wells TBS-50 cd; parting out B&W 5100 & SSB adapter, HT-37, BC-610E, w/coils & tune units. For sale: BC-610I w/coils & tune units; 50+ ARRL handbooks 1943-83. SASE for list. Bob Schafer, WA7IHN, PO Box 442, Aumsville, OR 97235, (503) 749-1149.

Set of **six coils** or any portion, to fit James Millen type 90651 grid-dip meter. Driver for small Amplion speaker (Dragonfly) model AR102. Reno Guggere, 504 Grill Ave., Shillington, PA 19607.

Speakers for E. H. Scott FM Phantom Deluxe and All-Wave 12. Any cond. spkr will help restore these classic radios. Michael A. Clark, RR 2, Box 90, Franklin, IN 46131, (317) 738-4649.

Crystal sets. Collection is now at 210 pieces and I am seeking more. Please make offer with your price and if possible include photo. Erwin Macho, Ambrosweg 17/A/8, A-1230 Vienna, Austria.

1937 Gross Radio CB-55 transmitter schematic and/or manual. Will pay/trade for any replication costs. Bob Mattson, KC2LK, 10 Janewood Road, Highland, NY 12528, (914) 691-6247.

Cabinet lid or parts set for RCA Radiola Grand. Also still looking for internal horn speaker for Radiola 24. J. R. McDermaid, 8302 Stonewood Dr., Sandy, UT 84093, (801) 943-6005

Hammarlund **Comet Pro** 5-pin **coil sets**. Will buy or trade for SW-3 coil sets. Want transistor novelties. Have Mork, football, tea cup and others for trade. Joel Levine, WB2BMH, 67 Derby Avenue, Greenlawn, NY 11740, (516) 757-7541.

Klitzen model 125 detector-amplifier (Radio Mfgrs. of the 1920s, Vol. 2, p. 170). Please state price and cond. Phillip Drexler, 1175 E. Ripley Ave., St. Paul, MN 55109, (612) 771-8630.

Manuals for the following BC-348 receivers: A/B/C/D/F/H/I. Also Army Air Force communications systems AACS 3 Vol. Dean Soderling, 6725 Portland, Richfield, MN 55423.

Any **info** on "Radiotron Tube Tester - Property Of Radio Corp. - Not For Sale" (ca. 1923-24), and Cummings Solodyne Receiver. Also want manual (copy OK) for Hickok #750 tube tester, Federal #226W AFTs (duds OK) and 1920s G.R. 1½" dia. knobs with small metal pointer. Lane Upton, PO Box 875, Pine Grove, CA 95665.

National SW-3, Pilot Wasps and Super Wasps, and Grebe CR-18. Top dollar paid for quality gear. Paul Christensen, 22242 Raley Creek South, Jacksonville, FL 32225, (904) 721-9111 before 5 PM.

National **SW-3 coils** and manual for Model 2 (copy OK). John Winans, WA2LGE, 34 Coleman Ave. W., Chatham, NJ, (201) 635-3674 collect.

Japanese amateur wishes to purchase your surplus **W. E. tubes**: 205FST, 205D spherical w/tip & getter, 264 and 300. Must have good emission/g_m for use in my audio amplifier. For details send SAE to Jun Yatsuyanagi, JH8SST/7 1-7 Hinai-machi, Aaraya, Akita, 010-16 Japan.

Any **radios used by OSS**. Examples are SSR-5, SST-1, or other sets with "SS" designations. Gary Cain, 1775 Grand #302, St. Paul, MN 55105.

Telegraph items in three categories: spark-era keys, early landline keys (camelbacks, etc.), and unusual bugs (speed keys). Gil Schlehman, K9WDY, 335 Indianapolis Ave., Downers Grove, IL 60515, (708) 968-2320.

Leeds and Northrup instruments wanted, NBS Type 4015 series resistors, Reichsanstalt 4221B, 4222B and Thomas 4210; Wheatstone Bridge 4232B voltboxes, mercury stands 4001, etc. Buddy Herring, 1310 Andover Rd., Charlotte, NC 28211, (704) 366-6600.

Gernsback's Educational Library (little yellow books) #1 Doerle Short Wave, #2 Most Popular Short Wave, #3 AC, #4 Aerials, #5 Dictionary, #7 Diagrams, #8 Radio, #10 TV. Want any or all of the set. Steve Dow, RR3 Zilinsky Road, Powell River, BC, Canada V8A 5C1.

Mac Key with cast lettering on base, US mil. keys, and an Autronic paddle. Tom French, 120 Great Road, Maynard, MA 01754, (508) 897-2226.

Schematic **diagram** and any other information for a Readrite Model 432A tube tester. Ken Greenberg, 4858 Lee, Skokie, IL 60077.

Sterling Deluxe chrome and plastic radio; Realtone pocket xstr radios and those of similar design; Regency TR-1; Regency TR-4; Sony TR-63. David Mednick, 1450 Palisade Ave., #5-H, Fort Lee, NJ 07024, (201) 461-3082 till 10 PM EDT.

Knight Ocean Hopper SW radio, sold by Allied Radio in the early 1950s. Ronald Thomas, 2479 Peachtree Rd. N.E., Apt. 303, Atlanta, GA, 30305.

Tube test settings for Precision Series 900 Dynamic Electronometer. Have instructions for the other operations. Will gladly pay for copying, postage and costs. Set of eight pushbuttons for RCA 97E armchair radio. Believe any model 97 will do. Steve Rustyak, 11023 N. Cayuga St., Ithaca, NY 14850, (607) 273-7027.

McMurdo Silver models 5D & 14-15, Patterson models 127 or 127A, 129 (chassis 127), 128 (chassis 127) and circuit diagram for McMurdo

Silver 1415. Hardy Trolander, 1475 President St., Yellow Springs, OH 45387, (513) 767-4551.

Transmitting tubes wanted for museum. Amateur or commercial. Tubes purchased, traded or donations welcome. All correspondence answered. Visitors welcome. Ye Olde Transmitting Tube Museum, A. C. Jones, K6DIA, PO Box 97, Crescent City, CA 95531, (707) 464-6470.

Rider's Manuals, Vols. 2, 4, 15 thru 23. Have Vols. 5-10, 13 for trades. Also need RCA Service Bulletins Vol. 1 and Sams 45-48, 50-52, 56, 60, 61, 81, 88, 89. Gary Micanek, 226 Henry Ave., Manchester, MO 63011, (314) 227-7046

Nye Viking MB II (manufactured 1978) antenna matchbox manual and schematic diagram. Bill Mills, 1740 Tonys Court, Amissville, VA 22002, (703) 818-3955 (office) or (703) 937-4090 (home).

Crosley Crystal IV; Grebe CR-18; Paragon RA-10, DA-2; Tuska 222; AK Radiodyne, 50, 553; Federal 57; Amrad 3500; Kennedy 110, III, VI and others. Will buy entire collection. Ed Bell, 5311 Woodsdale Rd., Raleigh, NC 27606, (919) 851-1517.

Cabinets for Philco 20 and 90, Apex Super 5, Amberola 16 and Federal 141. Speakers for Philco 20 and 90. Don Sturzenbecher, RT #3, Box 28, Sioux Falls, SD 57106, (605) 368-2135.

World War II type **LM frequency meter**; Philco Model 37-600 radio/chassis w/6A8G, 6J7G, 6K6, 5Y3G tubes. William Shibler, 5899 Barnes Ave., Bethel Park, PA 15102.

Table cabinet for R-390A receiver, panel 19" x 10½" x 14½" deep. R. Haworth, W2PUA, 112 Tilford Rd., Somerdale, NJ 08083, (609) 783-4175.

Atwater Kent **breadboard radios** and parts. Any cond., basket cases OK. Get my price. Paul Thompson, 315 Larkspur Dr., Santa Maria, CA 93455, (805) 934-2778.

Western Electric amps, rcvrs, tuning units, loop antennas, tubes, parts, literature. Marc Ingenthron, 9748 Outlook, Overland Park, KS 66207.

Need **Philco model 16** junker chassis code 125, 126 or 127; Sparton 517 original knob info; A-K thin glass 2-meg grid leak. Have 812, 807, 927, HY-65, 2C33, 24G, RX 233, 3D21 & 21/A, 715B, 3C24, 1624, RKR-73 & 72, 500+ other xmtg and receiving types. Lin Robertson, 1038 Turquoise #9, San Diego, CA 92109, (619) 488-3226.

U. S. **Amateur Callbooks**. From early 1900s Blue Books, ARRL Call Directories, Dept. of Commerce Govt. issues 1913-36 and regular Flying Horse issues 1920-40. Bob Arrowsmith, W4JNN, P.O. Box 166, Annandale, VA 22003.

Vacuum tubes marked "**Aeolite**" or "**Thalofide**," from old sound movie cameras and projectors respectively. May also be marked "Case" and/or "Auburn, NY." David Speck, 35 Franklin St., Auburn, NY 13021, (315) 253-8495.

TV & radio **broadcasting eqpt** (W. E., RCA, others): cameras, mikes & station "flags," consoles & mixers, amps, limiters, turntables, pickups, transcriptions, recorders (tape, wire, disc), blank discs, "on air" lights, catalogs, manuals, magazines, spkrs. Fancy console-deco-plastic radios (Scott, McMurdo, Capehart, Midwest, RCA, Fada, etc.). Jukeboxes. Numerous items for trade/sale: SASE. At fall meet. Robert Van Dyke, 2 Squires Ave., E. Quogue, NY 11942, (516) 728-9835.

Want following **tubes**: 211 (VT-4C), 242, 249B/C, 828, Western Electric 350B and 247A, to use in my W. E. 451A-1 160-m rig. Coil set for HRO-50, A coil for HRO-60, A and D coil for HRO-7. Need manual or schematic for RCA BTA-250K. Sam Thompson, W6HDU, 1031 San Antonio Ave., Alameda, CA 94501, (415) 521-1429.

P. H. Brans Vade Mecum, 1960 or older. State cond. and price. Willing to pay cash, or if you want am willing to swap a few old European tubes. Milivoj Rudan. 12 Mountain Ave. N., Apt. 606, Stoney Creek, Ontario, Canada L8G 3P1.

Gonset Commander transmitter. Jack Troup, WA6JYU, 15 Rica Vista, Novato, CA 94947, (415) 897-3987.

20- & 25-turn **Giblin-Remler honeycombs**; Giblin audio xfrs (2) Mod. 201A; Wecco crystal sets, models Stowell, Gem or Junior (Collectors Guide to Old Radios, p. 158); Radiola 30 power amp unit #AP947 or junker 104 spkr/pwr amp unit; Polleroyal "Gem of the Air" radio parts; band sel. knob for Scott Allwave 15; Warren horn spkr. Leonard Arzoomanian, 61 Columbus Ave., North Providence, RI 02911, (401) 232-0869.

Power-factor meter - portable testing type, would prefer single-phase. Henry Weiland, 8946 West Granstosa Drive, Milwaukee, WI 53225.

Will pay or exchange early unusual **tubes**, working or not as well as Sodion S11 and S14 types. Bring along to annual AWA Conference. Udo Radtke, Im Fuchtei 143, W-4830 Gutersloh 1, Germany.

Electric **clock** for Westinghouse grandfather's clock radio Model 801. Thanks! James Moran, 1408 Serre, Lasalle, Quebec H8N 1M9.

Military comm. eqpt, aircraft, naval and portable. Any vintage, nationality, rare or unusual. Example: R-395/PRD-1 accessories. All shipping and expenses paid. Have Scott 800B chassis, pwr. supply and spkr. Charles Di Cecca, KA1GON, 501 Mystic Valley Pkwy., Medford, MA 02155, (617) 396-9354.

De Forest DT-600, Everyman crystal set; Acme Model Y-1 detector and Y-2 amplifier unit; Tuska 222, 224 and 227. Richard Sharisky, PO Box 521, Belmont, MA, (617) 484-5784.

Early **light bulbs**/related items, pre-1900 Edison, Swan, West., etc., wkg or not. Plaster-wood in base bottoms. Literature & advertising; Edison lamp/wood shipping boxes; Edison Isolated Elec. Co. letters/envelopes, 1880s-90s.; Edison chemical elec. meter 1880s. Hilton NTR-800 xstr radio, 2-band MW-SW. Bill Hope, Box 780 Service Creek Rd., Aliquippa, PA 15001, (412) 375-1258.

B & W BVL 100-watt **inductors** for 40 & 80 m, split windings with adjustable antenna coil in center, with or without jack-bar base. Wes Chatellier, 1950 Chevelle Dr., Baton Rouge, LA 70806.

National BM dials; info on Western Radio Transmitter/Recvr.; KLM Echo II 2-meter SSB. C. Schiotz, K2PGB, 15 Runyon Mill Rd, Ringoes, NJ 08551, (212) 272-8131 days.

Western Electric 47A and 53A microphones and other early motion-picture sound eqpt. Colin Campbell, 17603 Stonebridge Dr., Hazel Crest, IL 60429, (708) 799-8769 after 8 PM.

British battery tube **sets** of the early 1920s. Ian Sanders, 16725 Wild Oak Way, Morgan Hill, CA 95037, (408) 778-7547.

Dorow Brothers Electric Co. of Hamilton, Ohio wireless equipment & related material. Charles Stinger, 404 Ross Ave., Hamilton, OH 45013, (513) 867-0079.

Transmitter of type used in WW II aircraft with receiver BC-348Q; schematics/manuals for US Army BC-348Q and US Navy CFT-46154 rcvrs. Ed Libera Jr., 1586 Ware Rd., Palmer, MA 01069.

RECENT RADIO AND ENTERTAINER OBITUARIES

Charles Griffen, W1GYR

Arthur Baum, 87, cable-television pioneer. He focused on CATV extensively in the 1960s and established an R&D group, also involved in the development of the push-pull amplifier and aluminum cable.

Cecil Effinger, 76, a composer who invented the MUSICWRITER, a typewriter designed for composers.

Jack Feldman, 69, partner, Hogan-Feldman, Inc., media brokers and consultants. He started at KSFO-AM in San Francisco in 1941. Had interests in many stations in the West.

John E. Fetzer, 89, broadcasting pioneer. Began his career as a researcher in 1918. He designed and built 500-watt KFGX-AM at Southwestern Michigan College. In 1930 he purchased the station and changed the call letters to WEMC-AM (now WKXO-AM) and moved it to Kalamazoo, MI. The Fetzer broadcast interests grew to include a large number of stations in MI, NE, IA and IL.

Dr. **Karen Gross Glenn**, 64, HDTV contributor; with husband Dr. William Glenn collaborated on the development of Vista compatible HDTV transmission system in the 1980s.

R. A. Jeu Devine, 66, retired broadcast engineer, was involved in new FM and TV installations in CA, NH, NM; was systems-design engineer for MCA-Disco Vision and helped develop "still-frame" capability of video laser disk.

Edgar F. Johnson, 91, founder of the E. F. Johnson Company, an early manufacturer of amateur transmitters, CB equipment and components used by the radio industry. He was first licensed as 9ALD in 1923.

Harry T. Montgomery, 81, retired VP and deputy general manager of the Associated Press; joined in 1937 and retired in 1974.

William H. Rule, 83, radio engineer for WEEI-AM in Boston for more than 40 years. He received his degree in broadcasting from the Eastern Radio Institute of New England.

Robert Strunsky, 84, former director of corporate affairs for CBS; he joined the firm in 1944.

Albert J. Sylk, 85, president of WPEN-AM & FM from 1947-70. The station was purchased by the Sylk family-operated Sun Ray Drug Co. to help sell the store's merchandise.

George V. Waldo, 85, retired FCC electrical engineer. He joined the FCC in 1941 and retired in 1970.

Jim Walsh, 80, authority on the early years of the recording industry. He wrote for magazines and worked for WSLS radio.

Karl Otto Wyler, 84, president and GM, Tri-State Broadcasting Co., Inc., and owner of KTSM-AM-FM-TV El Paso. Began broadcasting career in 1929; joined KTSM-AM in 1933 and put KTSM-TV on the air in 1953. He started KTSM-FM in 1962.

William Wright Bryan, 85, WW II correspondent credited with broadcasting the first eyewitness account of the 1944 D-Day invasion.

BOOK AND MAGAZINE REVIEWS

Edited by Bruce Kelley

THE HORN SPEAKER NOTEBOOK

By Floyd A. Paul. Rev. G, 1991, 102 pp., $13.50 plus $2 shipping, from the author, 1545 Raymond Ave., Glendale, CA 91201, (818) 242-8961.

This xerocopied booklet is a follow-on to notebooks made available in seven editions, 1980-86, and distributed in 160-plus copies. It supplements the Radio Horn Speaker Encyclopedia printed in 1986 and revised in 1989. The Notebook has over 450 horn-picture ads from the 1920s; 375-plus manufacturers are identified; and about 620 horn speakers are listed. Since the first Notebook was produced, approximately 100 changes have been made. New ads have been inserted, new makers identified, along with a few corrections and deletions. [Floyd Paul]

MORE GOLDEN AGE OF RADIO

By John Stokes. 208 pages (8" X 12"), hardcover, $39.95, from Vestal Press, Box 97, Vestal, NY 13851-0097, (607) 797-4872.

Third in a series by radio historian John Stokes, this is a sequel to his Golden Age of Radio in the Home. The current volume covers material not included in the earlier version, with a section devoted to radios in the U. S., Canada, Great Britain, Australia, and New Zealand. It has 1500 (!) illustrations, many not published before. [BK]

A TRANSISTOR HISTORY BONANZA!

Vol. 2, Iss. 1, of "Vintage Electrics," by Ed Sharpe. 92 pp., $10 from The Computer Exchange, 2224 West Desert Cove #205, Phoenix, AZ 85029.

Ed Sharpe, of the Southwest Museum of Electricity and Communications, has come across some very important pieces of radio-electronics history. He has gathered irreplaceable hardware and information on early days of the semiconductor world, particularly transistors.

"Transistors," you say! "Semiconductors," you say! Isn't that a bit modern? Not at all! The transistor was invented over 43 years ago, and the Nobel-prize-winning inventors (Shockley, Bardeen and Brattain) have all passed on. As a matter of fact, Ed was probably the last historian to interview Nobelist and AWA honorary member Dr. John Bardeen, just weeks before his recent death. Ed's challenge is to collect first-hand semiconductor history before all the pioneers disappear from the scene. Once these people have gone, we can reconstruct history only from dry records and secondhand information.

Ed's semiconductor odyssey started when he almost accidentally came across the archives of Kenneth D. "K. D." Smith. K. D. was a versatile scientist, engineer and natural leader, the key to breathing life into many products spawned by Bell Labs. K. D. died last year, and his priceless collection of experimental and pilot-production transistors, photocells, solar cells and other devices almost became landfill. Ed rescued these unique relics, and they are now in his museum.

These semiconductors are of great historical importance. However, even more important is his effort to coax first-hand history from the semiconductor pioneers who are still around. His first output is a compendium of articles by such early birds as John Bardeen, Jim Early, Bob Ryder, John Fairfield, Cullen Moore, John R. Pierce, Howard Dicken, Ivan "Jack" Saddler, Gerald Pearson and Morgan McMahon. Also included is Ed's interview with A. C. Dickieson, project manager for the revolutionary Telstar satellite communications system.

This compendium acquaints the reader with the exciting and compelling story of the beginnings of the semiconductor revolution. Also, it is a truly fitting memorial to the pioneers Smith and Bardeen. You'll be very pleased with this peek into the beginnings of the semiconductor revolution. [Morgan McMahon]

THE TROUBLE IS NOT IN YOUR SET

By Mary Ann Kelly. ISBN 0-9626159-0-5, hardcover, 360 pages, profusely illustrated with some in color. Available at Walden's and other book stores.

A chatty, easy-to-read book, which covers personalities and events in television between 1950 and 1990. Activity is centered in the Cincinnati area and the national networks. [BK]

1991 VINTAGE AUDIO & RADIO CATALOG

Vintage Wireless Co., Ltd., Tudor House, Cossham St., Mangotsfield, Bristol, BS17 3EN, England (0272 565472; fax 0272 575442).

This 70-page catalog is highly recommended for one interested in British sets, tubes and components. It is an English counterpart to the Antique Electronic Supply catalog. One may use it as a valuable reference or for purchases. Cost of mailing to U.S. available from the company. [BK]

NEW WIRELESS PIONEERS CAT. NO. 8

$1, from New Wireless Pioneers, Box 398, Elma, NY 14059, (716) 681-3186.

This is Jim Kreuzer's latest used-book catalog, useful for reference and purchases. I found the descriptions of early books highly educational. In addition, it tells what is available in used items and their current prices. Literature available in-

cludes rare items dating back into the 1800s, radio-pioneer biographies, wireless manuals, broadcasting, landline telegraphy, and light bulbs. [BK]

CRYSTAL CLEAR

By Maurice Sievers. 268 pp., to be available this summer from Vestal Press, address as above.

Ads, articles, chronological writeups, original prices, etc., on crystal receivers. [BK]

NOT REVIEWED BUT INTERESTING

THE HALLICRAFTERS STORY, 1933-1975

By Max de Henseler, HB9RS. Published by the Antique Radio Club of America; $14.95 plus $2 shipping, from ARCA Chapter Bookstore, 4204 Thorn Apple Lane, Charleston, WV 25313. [BK]

THE SETMAKERS - A HISTORY OF THE RADIO AND TELEVISION INDUSTRY

By Gordon Bussey and Keith Geddes, hardcover, 464 pages, £12.45 plus £2.50 mailing, from BREMA (The Setmakers), PO Box 52, Middlesborough, Cleveland TS2 1RR, England.

Written by Bussey ("England's Alan Douglas") and Geddes (retired curator, British Science Museum), The Setmakers covers England's leading radio makers and their products, from the early days of broadcasting to the present, with nearly 500 photos, 100 in color. Undoubtedly it will be a leading reference for British collectors. Published by the British Radio & Electronic Manufacturers' Association. [BK]

LAWLOR'S RADIO VALUES - CATALIN, CHARACTER, MIRRORED, NOVELTY, PLASTIC

By Michael Lawlor. $12.50 plus $1.50 postage & handling, from Bare Bones Press, Dept. CM, PO Box 179, Santa Barbara, CA 93102.

Museum News

FOOTHILL MUSEUM PACKING

The staff of the Foothill Electronics Museum is currently preparing to move its displays and reserve collection from the Foothill College campus. The material is being computer-inventoried and packed. Duplicate items are being culled for disposal (see the CHRS announcement on p. 3) with the aid of such volunteers as tube expert Al Jones, K6DIA. The requirement is to clear the premises by September 15.

Three sites are under consideration for the new location. In the mean time, the museum is open with some excellent displays. For details, the museum phone is (415) 949-7383. In addition, the "Radio Collector" video is still available as described on p. 46 of the February OTB. [Information from Will Jensby and especially Mike Adams]

IHRS RADIO MUSEUM MOVES

After 14 years at the Auburn-Cord-Duesenberg Museum in Auburn, Indiana, our museum has been expanded and moved to two new locations. Indiana Historical Radio Society members Don Myers and John Kellar were instrumental in establishing the first exhibit at the Fulton County Historical Society Museum, four miles north of Rochester, Indiana, on US 31. The radio display features Indiana-made radios, with a total display of 60 sets and two phonographs. Look for the round barn and the museum sign on US 31. Hours are 9:00 AM to 5:00 PM, closed on Sunday.

The second display was opened on March 1st in the Northern Indiana Historical Society Museum at 112 S. Lafayette Street, South Bend. Featured are radios built in the area, such as Lyradion, Diamond "T," and Kennedy AC radios. The museum is located in the Old Courts Building in the center of South Bend. AWA members are invited to stop and see our museums this summer. There is no admission fee. [Ross Smith]

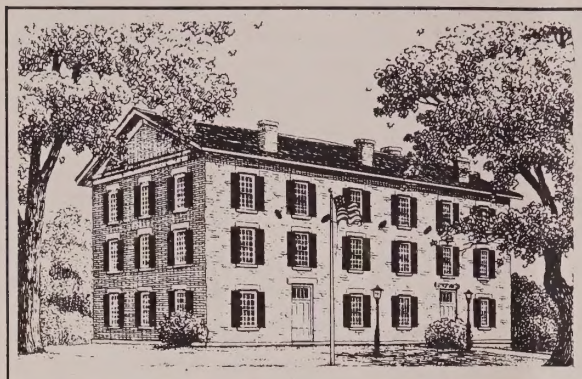
NEW MUSEUM IN ITALY

The Museo Della Radiofonia opened in May, with a major focus on broadcasting and broadcast receivers in the '20s-'40s period. It is located at Via Acilia 242, Rome 00126, and is open daytimes except Saturday, Sunday, and Monday mornings. For details, contact Enrico Tedeschi on (+39) 6 60 56 085, FAX 60 54 595.

HISTORICAL ELECTRONICS MUSEUM

This museum, just south of Baltimore, is operated by a foundation originally funded by Westinghouse and displays mainly military electronics by that company: WW II and Korean radars, missile controls, countermeasures equipment, etc. Comm gear includes a Navy TBL-13 transmitter, as first used to equip the 50 destroyers that were Lend-Leased to Britain in 1940; the TBK, TCE, and TBY; the BC-520 and SCR-522. Radars include the APQ-35, APG-66, DPN-53, side-looking sets , and AWACS system. There are a few more "conventional" items like a Marconi magnetic detector. The tube displays begin with a 1908 Audion and proceed to the '60s. The current project is restoration of an SCR-270 radar in time to commemorate the 50th anniversary of Pearl Harbor, complementing the museum's restored SCR-584. The museum is nicely housed, with a research library and full-time staff. Hours: weekdays, 9:00 - 3:00, at 920 Elkridge Landing Road, off the Baltimore-Washington Parkway near the BWI Airport. Phone: (301) 765-2345. [Information from Don Daykin]

THE MUSEUM



AWA ELECTRONIC COMMUNICATION MUSEUM

Location: Village Green, Rtes. 5 & 20, East Bloomfield, New York
Hours: May 1 through October 31: Sunday, 2-5 PM; June 1 - August 31: Saturday, 2-4 PM; Wednesday, 7-9 PM. (Closed Holidays)
Group tours by appointment: 716-657-7489
Museum telephone: 716-657-6260
Amateur Station: W2AN
FREE ADMISSION

NEW MATERIAL FOR MUSEUM

Chuck Bliley, K2NAU; Paul Bohlander, W3-VVS; John Bruning, W8DSR; Mike Csontos; Jack Davis; Bob Fannetti, NN2M; Ken Greenberg; Jack Hallauer; Joe Koster, WA2RGN; Ed Maher. WB2ZJY; Bill Marsh; Bill McCarren, K2LV; Joe Meyer, W2VW; Charles Pratt; Harry Stockman; Adolph Uryniak, W2UT; Lee Van Der Bokke; Dick Waddell; Frank Wiethuechter, K2RSY; John Williams.

MUSEUM NEWS

Museum attendance has increased noticeably as a result of the article in the April issue of QST. Recent visitors include radio officers from Egypt, a Canadian Marconi representative, and two curators from the Ford Museum at Dearborn. The Museum continues to loan equipment to non-profit organizations for display. The large exhibit at Rochester's Strong Museum will continue until next June. Material is, or has been, on loan to St. John Fisher College, Geneva Theater, the Ford Museum, and the Community College of the Finger Lakes.

The Annex Committee meets periodically on Tuesdays at the Annex to catalog and restore material. A major program is planned to build an area to house the transmitting and older tubes now in the old Barn Museum. If interested in joining the group, call the curator.

The club station W2AN is currently on SSB at the Annex, using the new 480-foot square antenna. Connected as a square, it is omnidirectional. With far end open, it is a small bidirectional rhombic. [BK]

EARLY BROADCAST TRANSMITTER

One of the first broadcast stations in the Seattle area went on the air in 1922 under the call 7XJ. It was licensed to former AWA member Charles Peterson, ex-7CW, using a transmitter built in the same city by Kilbourne & Clark Co. In all probability, Peterson designed the transmitter, since he was laboratory manager for the company.

Charlie left the Seattle area to engineer the Musicone speaker for Crosley Corporation, as he held the basic patents. He later moved to Rochester, where he died in 1973. Luckily, he had kept the transmitter, which was donated to the AWA Museum.

It has an interesting circuit: it is both a transmitter and receiver, using two VT-2 type tubes. A "send" switch makes one the oscillator and the other a Heising modulator. Reverse the switch and the oscillator becomes a regenerative detector and the modulator a stage of audio.

As with its contemporary, the de Forest Type OT-10, the single-button microphone is mounted on the panel. A card holder displays the call letters 7XJ. An input for a second microphone and a selector switch allowed for music broadcasts by playing a wind-up phonograph in front of the external mike. A Century buzzer at the lower right allows for ICW work.

Early photo of the transmitter.

The Museum is most fortunate to have this rare and historic piece of equipment. -BK

[The 1922 Callbook also shows the experimental call 7X*K* as licensed to Kilbourne & Clark, showing the close relationship between 7X*J* and the company.]